THE GRAY SHEET

# Computer Industry

REPORT

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# Computer Industry REPORT

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# The Emerging Component-Based Desktop: The Object Is Integration

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The personal computer — once viewed only as a platform for the creation, management, and analysis of information in isolation — is used increasingly to support information exchange and collaboration with other users. The key to making this functional leap is integration: integration among applications on the desktop — and with applications on remote servers. In addition, users' desktops need increasingly to be integrated with an information exchange and collaboration infrastructure — mail, messaging, groupware platforms, shared databases, workflow managers — to support greater workgroup and organizational productivity.

Today's PC is in fact an integrating platform, in which applications and system services are seamlessly linked in support of the user's work. However, this change demands a restructuring of monolithic system software and applications into components that may be easily integrated with one another and therefore incrementally enhanced. Accordingly, the battle over how the desktop will integrate into the enterprise, and over what the desktop software environment itself will look like, is intensifying. As usual, the battleground is control of de facto standards, and the winner will likely set them.

This issue of *The Gray Sheet* presents a functional model of the emerging component-based desktop, with particular emphasis on compound document architectures and the object models and services that support them. The model assists in the prediction of how the elements of the component desktop will fill in and which competing technologies will set the standards for those elements.

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## The Component-Based Desktop: Key to Next-Generation Corporate Applications

Who cares about the transition of the desktop to a component-based integration platform?

Creating desktop platforms that enable integration is the top architectural priority for system software suppliers: integration among logical elements on the desktop

*The Gray Sheet*

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(e.g., applications with applications, applications with operating system services) and integration of desktop systems with off-desktop resources (e.g., data, procedures, objects, mail/messaging services).

Much of the initial focus on PC integration has been on providing hooks to off-desktop resources (mail, remote data, remote applications, etc.). But for the PC to truly integrate with resources across the enterprise, it must first become more proficient at integrating the many resources that reside on the desktop itself.

Why is this important? The integration of resources on the desktop is quickly moving to the center of virtually all levels of application development: there is now little doubt that the desktop will be the focal point even for the next generation of large-scale enterprise applications.

Desktop application integration, groupware computing infrastructure, run-time object repositories — all ostensibly aimed at desktop applications and users — will in fact be critical pieces of the next generation of corporate applications. These strategic business systems, while designed to be as robust as their predecessors, will have a distinct "bottom-up," desktop-centric feel. They will not be isolated from the users' desktop applications, but will in fact be seen as extensions of the native desktop application environment.

Thus the transition will also quickly become of vital importance to corporate users of desktop systems.

## Beware the Strictly Desktop-Centric!

This caveat may seem strange in a discussion of the increasingly important role of desktops in the future of corporate computing. The center of the application development universe is clearly shifting toward the desktop (and workgroup). Indeed, all recent trends in spending (investment power) and new technology creation (innovation power) point to the desktop as the focal point for the next generation of business systems.

But while the desktop offers the user interface and, increasingly, the integration capability to provide the focal point for developers of these systems, not all code and data should reside on the it. To the contrary, for large transaction-oriented applications, the desktop is the worst place to put code and data.

Clearly, it would be a mistake to interpret our research as advocating for a purely desktop-centric view of the IS world. Both purely mainframe-centric and desktop-centric views are inadequate and hopelessly outdated.

## A Functional Model of the Component-Based Desktop

The IT industry is in the midst of a fundamental redesign of the desktop operating environment to support an information-centric environment featuring, in effect, "borderless" applications. The redesign involves a disintegration of desktop function — from system services through application functionality — into components or objects that may be shared within the context of a user's arbitrary view of information (i.e., within a user's work space).

Discussion of the details of the manner in which specific desktop functions will be delivered causes many disagreements among suppliers. However, a level of consensus as to the core functional needs of this environment is emerging. Although each addresses the integration question

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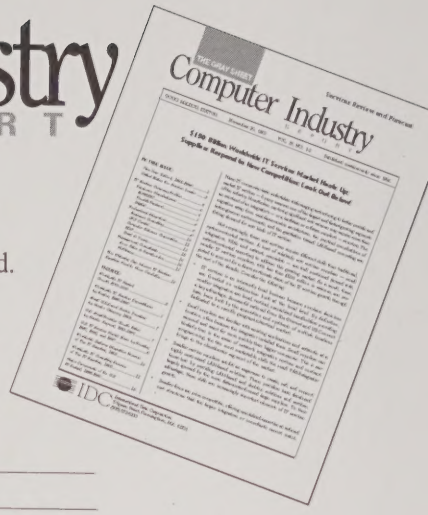


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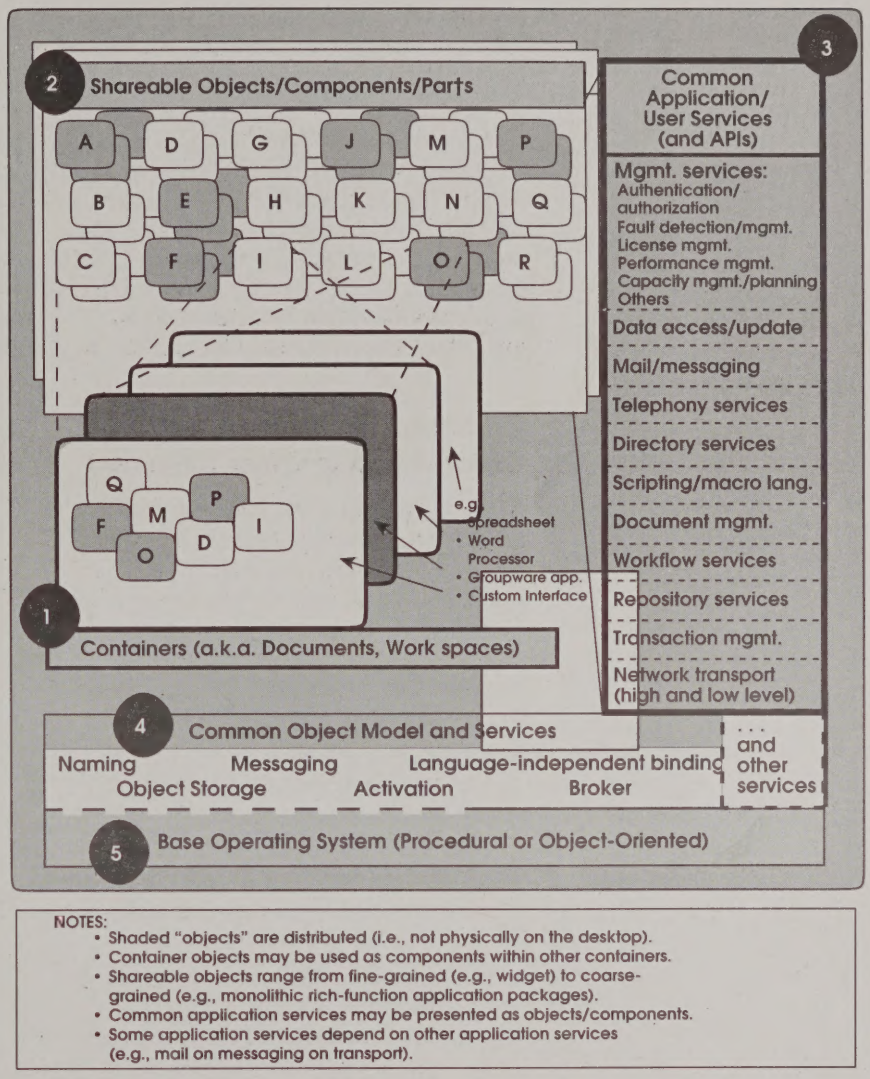
from somewhat different perspectives, Microsoft's WOSA (Windows Open Software Architecture), Apple's VITAL (Virtual Information Technology Architecture & Lifecycle), Open Software Foundation's (OSF's) Distributed Computing Environment (DCE), and other frameworks present significant overlap. The emerging desktop model may be viewed as composed of five interrelated elements.

These categories are somewhat arbitrary divisions. Application services going forward will likely be implemented as components within object/component libraries; there will be a blurring of the line between application objects (in development workbenches) and object services components; and as underlying operating systems become more object oriented, the line between the object services layer and the base operating system will fade. The elements include the following:

Elements of the Emerging Desktop Model




NOTES:
- Shaded "objects" are distributed (i.e., not physically on the desktop).
- Container objects may be used as components within other containers.
- Shareable objects range from fine-grained (e.g., widget) to coarse-grained (e.g., monolithic rich-function application packages).
- Common application services may be presented as objects/components.
- Some application services depend on other application services (e.g., mail on messaging on transport).

*Source: IDC/Technology Investment Strategies, 1994*

## *1. Container/ Workspace*

This is the "application" view that users work in when manipulating information. In a dis-integrated desktop environment, the application in which the user is working may consist of a "container" application, which includes built-in capabilities that map on well to the user's information manipulation needs.

The container application may import functionality from other applications/objects as well. For example, if a user frequently performs mathematical functions on information, an appropriate container might be an off-the-shelf spreadsheet package. For purposes of editing text within the spreadsheet, the developer or user may choose to import functions from a word processing package or import a simple text editor object into the spreadsheet environment.

Other off-the-shelf applications, like word processors, database management systems, or integrated groupware packages, might be appropriate user work spaces or containers for other users. In some cases a custom front end rather than an off-the-shelf package might be required. Many containers may not only import component function from other objects on the desktop (or remotely), but also may export functions to other containers.

The most widely discussed container/work space metaphor today in the Windows environment is the compound document. And the container/compound document architectures vying most vigorously for developers' attention are Microsoft's Object Linking and Embedding (OLE) and the Component Integration Labs' (CIL's) OpenDoc. (CIL's primary backers are Apple, IBM, and WordPerfect.) These container architectures ride on top of more generalized object/component models: OLE on Microsoft's Component Object Model (COM) and OpenDoc on top of IBM's System Object Model (SOM).

### 2. Shared Components/ Objects (a.k.a. Class Libraries)

Applications and application components are the functional building blocks that, combined in a container/work space, deliver to users the integrated functionality that is appropriate to their needs. In the ideal component-based desktop model, each of these objects may be local or distributed (shaded in drawing). As noted above, they may act both as containers (import function from other objects) and as objects within other containers. They may range in function from fine-grained (e.g., widget) to coarse-grained (e.g., monolithic, full-function application package).

In the ideal component-based desktop, objects written in different languages may work with one another, so a desktop library could include components written in C++, SmallTalk, Basic, COBOL, or proprietary 4GLs.

Today, these components are developed using developer workbenches, typically including foundation classes or building on a major vendor's foundation class. Many of these environments include their own proprietary component models/run-time environments. In the ideal desktop, object/component models and services are not built into the toolset level, but are made available across all objects in a common object services layer (see element No. 4).

A fundamental debate among the major object/component players today is about what level of granularity will be practical in an object/component-based environment. Some (including Microsoft) argue that mixing and matching large numbers of very small objects built in different language environments is a long-term vision that will be impractical to implement in the near- to medium-term future. They argue that object/component computing will be most practically implemented as interaction among coarse-grained components (applications or major application components). This view appears to differ from IBM's vision, which is aimed at allowing fine-grained, heterogeneous object computing via IBM's SOM.

Following are examples of component or object-oriented programming environments vying to play a role in creating component/object class libraries for the component-based desktop:

- C++, C
- SmallTalk
- NeXT Application Objects
- Taligent Application Environment/Frameworks
- Novell Visual Appbuilder
- Microsoft Visual Basic
- Powersoft PowerBuilder
- IBM Visual Age
- SunSoft C, C++, DOE Application Objects
- Hewlett-Packard C, C++ SoftBench, SmallTalk

### 3. Common Application/User Services

These are common services accessed by applications — and in some cases, directly by users — in support of information creation, exchange, and collaboration. Increasingly, common application/user services' APIs may be encapsulated as objects in language development environments (as depicted in the drawing).

The application services are not comprehensive and are not in any particular order/hierarchy. Some may overlap with

and/or depend on other application services (e.g., mail on messaging on transport). In many but not all cases, these services are provided by a back-end server, and their APIs represent integration "hooks" into the off-desktop environment.

### 4. Object/Component Services Layer

A layer of services and interfaces to those services supports the creation, storage, activation, and binding of components/objects, as well as other object services. The services are built around a specific model of what objects/components are and how they behave. As noted above, the goal in having such a systemwide layer is to drive common object services out of multiple disparate language and language-specific run-time environments and into the system software, in order to facilitate integration and interoperability of heterogeneous components.

Among the products that embody some or all of the object/component services listed in the model illustration are:

- Microsoft Component Object Model (in Cairo, Chicago, [nondistributed] Windows 3.1)
- IBM System Object Model (and Distributed SOM)
- Hewlett-Packard Distributed Object Management Facility
- SunSoft Distributed Object Environment (DOE)
- NeXT NextStep/OpenStep Distributed Objects
- DEC ObjectBroker
- AppWare Foundation (Novell recently decided to diminish support)
- Taligent Object Services — coming in late 1995

Not all these vendors and technologies map exactly onto one another. For example, IBM's SOM presents a programming model (language-independent) that supports interaction among objects within a single address space (in-process). An object (or component) programming model is a fundamental starting point for any desktop component software model. Some would argue that such a model is purely the domain of language (e.g., C++, SmallTalk) vendors.

In contrast to the programming-model–focused SOM, object broker products HP DOMF and SunSoft Distributed Object Environment — as well as the Object Management Group's Common Object Request Broker (CORBA) specification — focus more on object distribution. And IBM has added distribution capabilities to SOM via Distributed SOM (DSOM), which provides capabilities for SOM objects to communicate across address spaces (out-of-process) and across systems (distributed).

Microsoft's COM addresses both in-process and out-of-process/distributed methods. COM, in its current implementation, supports both in-process and out-of-process object interaction. It does not support distributed today. As discussed below, Microsoft is working to deliver a version of COM (and OLE on top of it) that supports distributed-object computing.

Efforts are currently under way to support IBM's SOM on top of SunSoft's DOE and — until recently — on HP's DOMF. In these cases, the vendors are (for HP, were) betting on SOM as a good (albeit not the only) way to draw the interests of application developers. HP recently backed away from the SOM-on-DOMF project, citing concerns about SOM's fundamental approach. Notwithstanding HP's reservations, it appears to us that the in-process model battle is turning out to be between IBM SOM and Microsoft's COM/OLE.

### 5. Base Operating System

This is the interface to and manager of the system's hardware resources (memory, processor, I/O), file systems, and other core system services. Microsoft dominates today's desktop operating system market, with Windows/DOS, standalone DOS, and Windows NT. The only other desktop OS with more than 10% market share is Apple, with MacOS. IBM continues to drive the OS/2 campaign and has gained some momentum in the last 18 months, but OS/2 remains a long shot to establish a significant presence on the desktop.

Desktop Unix, as indicated in the market data referenced above, is a rarity and is likely to remain so as long as users and developers know or care what the underlying operating system is.

Although the short-term future for desktop operating systems is to layer object services on top of the legacy OS, vendors are increasingly driving object-oriented technology further down into the operating system. For example, in the next major release of Windows NT, code-named Cairo, Microsoft is delivering an object file system as a core storage facility.

To facilitate the implementation of more system-level functions in objects (and toward an object-oriented OS) and to enable greater hardware independence, the leading desktop OS vendors are squeezing the OS kernel into as small a piece of code as possible. Microsoft asserts that NT is based on a microkernel architecture that will be the base for what it positions as its object-oriented operating system, Cairo. Taligent's Object Service OS (a likely successor to IBM's OS/2 and Apple's MacOS) is based on a variant of the Carnegie Mellon Mach microkernel (in a joint development with IBM). And NeXT, a pioneer in object-oriented desktop operating environments, already boasts a microkernel core (again, Mach based) for NeXTStep.

## Which Way to the Component-Based Desktop?

That the desktop is moving to a component-based architecture is indisputable. What is not as certain is which vendors' competing architectural standards for each of the building blocks of the new desktop will win. This is a critical issue for developers, as they must place significant bets in the next several years, even as some standards battles continue to rage on.

### *Who's Setting the Standards? The Money's on the Desktop*

Who's really going to set the PC integration standards in the marketplace? The Unix community (largely midrange systems), which has led much of the distributed computing standard-setting of the last decade? How about the large-system suppliers who claim broad experience in supporting large-scale enterprise computing? Neither. There is little doubt that PC suppliers are now in the driver's seat for setting desktop integration (and perhaps broader) standards.

The vendors that serve the desktop computing environment now drive the majority share of revenue in the industry. As seen here, over the last decade and a half, shipment value of PCs and workstations in the United States soared from a minuscule 6% in 1978 to over 49% in 1992 (this trend is also representative of the worldwide situation).

Often, distributed computing experts ask: How will PCs integrate into the distributed computing world? Ironically, given the enormous tilt of financial resources, installed user investment, and industry clout away from the server community and toward the PC community, it might be more appropriate to ask: How will the distributed world come to integrate into the world of the PC?

**Bottom line:** The industry is becoming increasingly dominated by the desktop world, and those who control the desktop are in the best position to set the rules for the rest of the industry.

### *Windows Is the Clear Desktop Standard, Macintosh (a Distant) Second*

Windows is growing in its domination of the market. IDC estimates that Microsoft accounted for 77% of desktop operating system units shipped in 1993, with three-quarters of those units some form of Windows; the remainder were DOS shipments. And Microsoft intends to bring most or all of its DOS base over to Windows.

The next largest community is the Macintosh, which accounted for 11% of 1993 unit shipments (and less than 15% installed base). OS/2 accounted for 10% of 1993 shipments, but holds less than 10% of the PC installed base. Unix accounted for only 1% of 1993 PC shipments. Although the Unix community is making some headway in bringing Unix variants together (via efforts like the Common Desktop

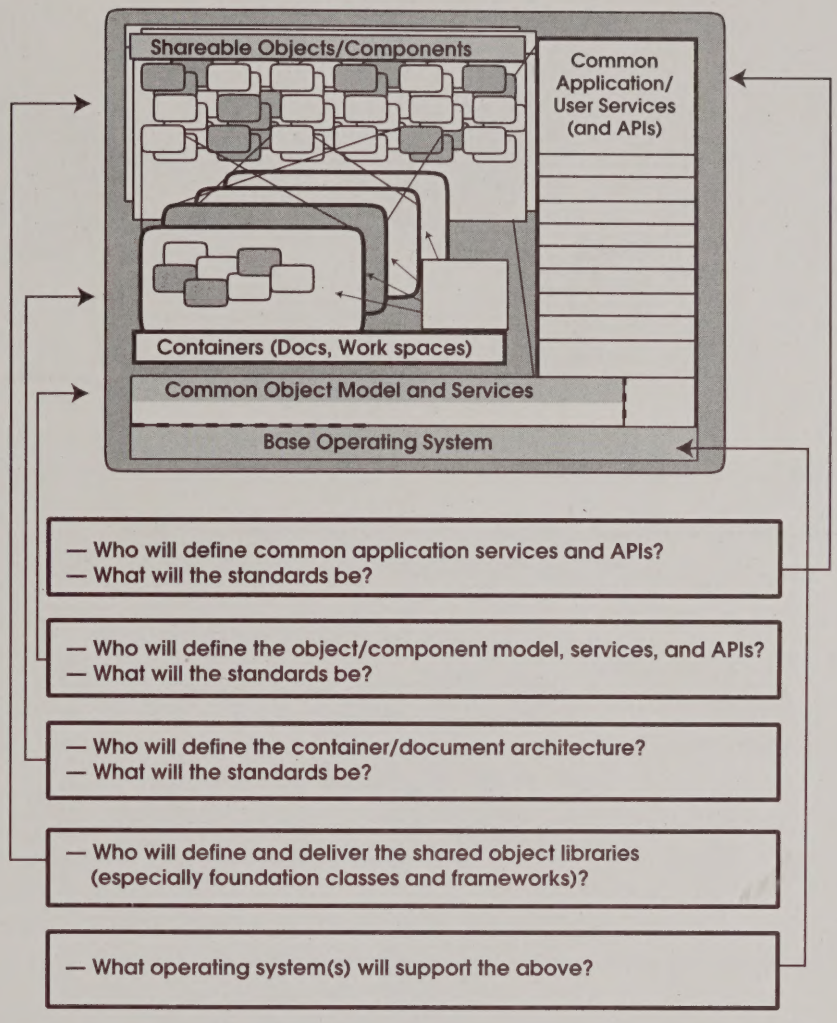
Environment), it appears that the overall PC marketplace is not very interested.

Windows is the PC market today, and while on the hardware side the stability of Intel's franchise (vs. the RISC crowd) over the next five to seven years is certainly open to debate, there is scant evidence that Microsoft will cease to be the dominating force in desktop operating software in that time frame (yes, that was said about IBM 10 years ago!).

Will Windows dominate the desktop forever? No vendor or product dominates forever in the computer industry, but for the period that is most germane for today's ISVs and corporate developers — the next five to seven years — the Windows family is the platform with the greatest leverage and the least risk.

**Bottom line:** the desktop operating-system wars, Part I (i.e., between the traditional procedural operating systems), are over, and Microsoft Windows has won. This victory gives Microsoft and Windows a strong leg up in Part II (object-oriented application environments and operating systems), but as discussed later, that battle is not yet over.

Key Issues in the Component Desktop




*Source: IDC/Technology Investment Strategies, 1994*

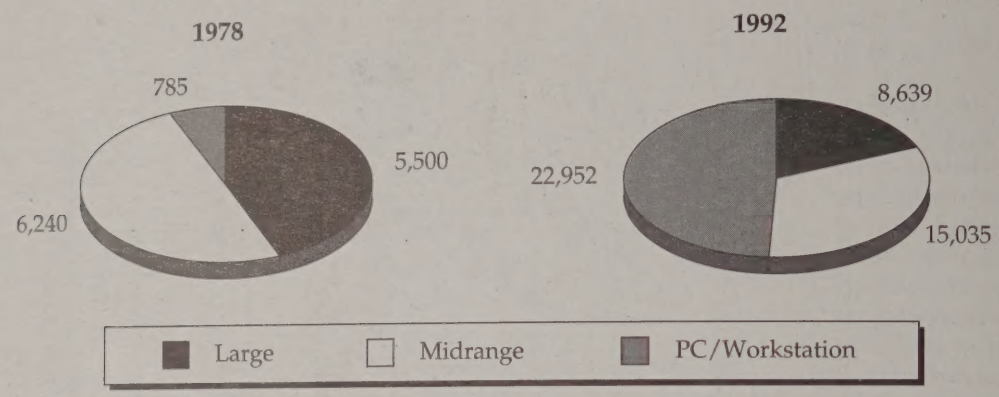
## *The Key Issues of the Component-Based Desktop*

The shift to a component desktop model presents a fundamental change in the desktop system and application software environment. To fully exploit the benefits of this model, commercial and corporate developers will have to significantly modify or rewrite much of their software.

This shift presents a rare opportunity for vendors to redirect the hearts and minds of the development community toward their camp and away from competitors. More specifically, it gives Microsoft's competitors (IBM, Apple, Lotus, Novell/WordPerfect, Borland, et al.) a second chance: first, in the systems software business and second, in the applications business. Microsoft, on the other hand, sees this shift as an opportunity to solidify and strengthen its hold on the desktop software market and extend its influence into the server realm.

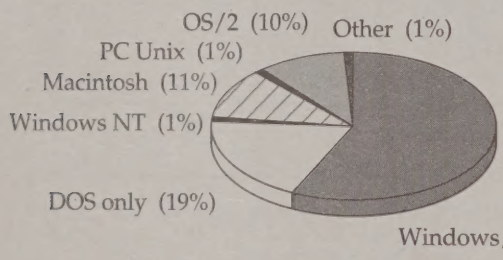
It is no wonder, then, that we are in the midst of major battles over not only how the desktop will integrate into the enterprise, but over what the desktop itself will look like in the coming decade. The battles are about standards for each of the major elements of the component desktop and who will set those standards. The challenge for developers will

U.S. Shipment Revenue ($000) by Platform Class: 1978, 1992




*Source: International Data Corporation, 1994*

Desktop Operating System Shipments (Units), 1993




*Source: International Data Corporation, 1994*

be to choose the right would-be standards, ones that maximize opportunity (e.g., portability) and minimize risk (e.g., technology dead-end).

Using the component desktop model presented earlier as a framework for discussion, let's look at the key elements of the desktop and discuss the options.

## Base Operating System: The First Battle Is Over, a New One Is at Hand

As noted earlier, there's not much of a battle among the current crop of procedural desktop operating systems. In spite of the Unix community's and IBM's hopes, Microsoft's Windows family is likely to continue domination for at least the next four or five years. (Indeed, the Unix community's Public Windows Interface [PWI] and IBM's OS/2 support of "Windows Better than Windows" effectively concede this point to Microsoft.)

The interesting issue going forward, however, is whether the object services layer (e.g., IBM's SOM) will succeed in getting between the base OS and application, making Microsoft's system software franchise a little less secure. Frankly, this is an uphill battle for Microsoft's competitors. The leading vendors are now focusing on evolutionary courses to object operating systems, which would tend to continue Microsoft's desktop OS franchise.

Both IBM (with OS/2) and Microsoft (with Windows 4.0 and NT/Cairo) are effectively introducing object services layers onto versions of their current operating systems, rather than a direct leap to pure object-oriented operating systems. With such a relatively gradual transition planned, the battle for control of the next-generation base operating system appears to be Microsoft's to lose.

The greatest positive for Microsoft, of course, is its massive installed base. The biggest negative is its proprietary posture, specifically around (1) limited support of non-Microsoft standards and (2) availability of technologies that Microsoft is pushing as standards on Microsoft-only platforms (with rare exceptions, such as OLE on Macintosh).

The former position puts a long-term drain on Microsoft financial resources; history has shown that no vendor — even IBM — can invent every wheel,

attempting to outspend and out-innovate the rest of the industry, for very long. And both postures limit Microsoft's ability to talk to other resources in a distributed environment. In the short term, as long as Windows continues to dominate the desktop and Microsoft is content to focus only on the desktop, this posture may not be a net negative. However, given the fact that the component/object computing model is clearly emerging in a *distributed* systems context, a proprietary posture is short-sighted.

**Bottom line:** The safest bet for desktop operating systems (although not guaranteed to be without frustration) is clearly Microsoft's Windows-to-Cairo path. The other contending operating environments plan to or already incorporate support for running Windows applications, and this will be extended to support 32-bit Windows as well. At this point, Macintosh is in distant second place and OS/2 is a distant third. The order won't be changing anytime soon. Unix is a non-factor at the desktop, and will remain so, except perhaps as a microkernel hidden under a Windows, OS/2, Mac, or other shell.

As for the Taligent operating system (due out in 1995), the release of the Taligent Application Frameworks on other operating systems weakens the short-term draw of jumping to the full object-oriented OS, but may strengthen Taligent's hand in the longer term. In other words, the fate of Taligent, the operating system, will be determined by the success or failure that Taligent, the application environment, achieves on current desktop operating systems.

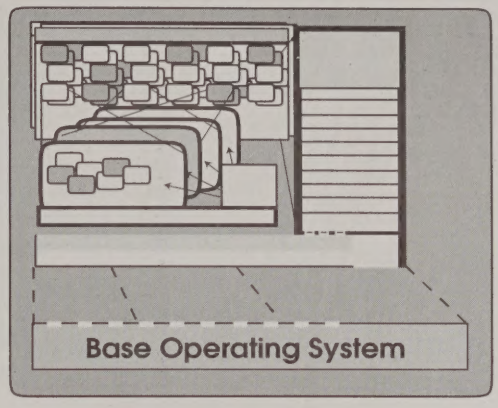
## Common Application and User Services: A Mix of Consensus and Contention

The common application and user services area contains of a mix of consensus and hotly contested battles over a plethora of high- and low-level service APIs. Some brief comments about some of the major services are worth making:

- **The Open Software Foundation's DCE seems to be winning consensus support in key service areas.** This is particularly so for remote procedure call (DCE-RPC) and authentication (Kerberos), both of which are supported in part by Microsoft, in addition to the major Unix players. Ironically, Microsoft's support of the DCE Interface Definition Language (IDL) — rather than OMG's CORBA IDL — as its language-neutral component interface for the OLE/COM environment presents a departure from, rather than a consensus with, some of OSF's founders (IBM and HP). (See object services discussion below.)

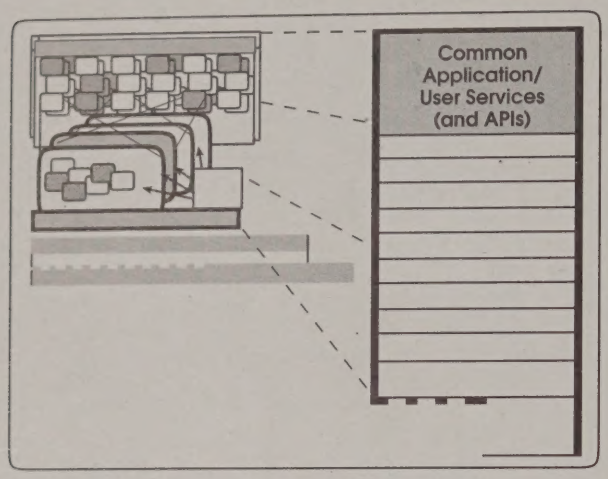
- **In data access, Microsoft has established broad support for its Open Database Connectivity (ODBC)** as a least-common-denominator call-level interface to relational data bases, although performance limitations of early ODBC drivers has led to ODBC criticisms. An important ODBC supporter from a desktop perspective is Apple, which has architected its Data Access Manager in System 7 to support several data access APIs, including ODBC. Happily, Microsoft does not seem to be too hung up with reinventing the wheel here: it based ODBC on the SQL Access Group's call-level interface (CLI). ODBC's purported rival for CLI standard is the integrated database API (IDAPI), a joint effort by Borland, IBM, and others. IDAPI's claim to fame is that it will allow access to heterogeneous, not just relational, data sources. Support for IDAPI is weak, however.

Base Operating System: Battle for the Next Generation




*Source: IDC/Technology Investment Strategies, 1994*

Common Application and User Services




*Source: IDC/Technology Investment Strategies, 1994*

- **In mail/messaging API, there is agreement on the X.400 API Association's (XAPIA) Common Messaging Calls as a least-common-denominator solution.** Microsoft's mail-oriented Messaging API (MAPI), the leader, and Lotus's more messaging-oriented Vendor-Independent Messaging (VIM), the trailer, will both provide interfaces to CMC. The forthcoming CMC 2.0 specification is emerging as the focal point for expanding the mail API to handle more complex tasks, such as complex addressing. However, while "messaging" is in each of the API names above, there is a definite "mail" orientation to each. As interfaces to more generalized messaging transport services, they lack the more sophisticated transaction logic and prioritization that messaging transport systems from others offer. IBM and Novell's messaging technologies appear poised to play key roles in X/Open's messaging standards. In the long term, the messaging- and mail-oriented communities could well converge around a merged X/Open and XAPIA/CMC specification or a superset of both.

## Object Model/Services: IBM SOM vs. Microsoft COM

Common object services are at the heart of the component desktop vision. The area of greatest debate and greatest risk/opportunity for suppliers is the setting of standards for a generalized object/component model and services layer, and a compound document model/ framework on top of it. This is where today's real desktop battle is, and this is why:

> If the next generation of desktop operating environments is going to be object oriented, and the object services layers being put on today's operating systems represent the bridge that will take customers and applications there, then the battle for object services is vital to all desktop suppliers.

This transition represents a rare opportunity to open up control of the desktop system software business (and, in turn, applications) to vendors other than Microsoft.

As noted above, the major vendors are initially supporting the component-based desktop by adding a layer of code that supports object or component software on top of their current desktop operating systems. On the desktop, the leading services layers (and underlying object models) are IBM's System Object Model (SOM) and Microsoft's Component Object Model (COM)3. The Component Object Model is the object model underlying OLE 2.0.

The battle over the desktop object services environment — meaning the definition of a software object/component and the way it behaves, and facilities for its creation, naming, storage, activation, and communication with other objects — centers on IBM SOM (and DSOM) and Microsoft's COM.

Both models create their own component software support/run-time environments by providing the definitions and services listed above. Their common goal is to define a model that provides a standard language-independent, binary format for dynamically binding software components/objects — that is, to support mix-and-match, incrementally extensible software. Important attributes distinguish one from the other, however.

### Inheritance vs. Aggregation

SOM supports implementation inheritance, allowing developers to rapidly create a new object class by effectively cloning an existing one and then modifying the source code to incrementally create the new class. COM does not allow implementation (i.e., code) inheritance. SOM supports reuse by "inheriting" the interface to an existing object and incorporating a pointer that forwards messages to the original object in the newly created object. Thus, the SOM class library structure may be viewed as a traditional class hierarchy, with child objects able to be inherited from parent/base objects. The COM environment can be viewed as an essentially flat structure, with "inheritance" achieved through a web of pointers that link (or aggregate) the functions of peers.

IBM stresses the benefits of source-code reuse of SOM's full implementation inheritance. Microsoft, on the other hand, frets about the complexity and potential fragility of classes of SOM objects that have inherited code dependencies from base classes that may not be well understood or documented (particularly in the desktop environment, where dozens of different suppliers may author the components). IBM, of course, insists that the "base class fragility" that Microsoft claims SOM is vulnerable to is a risk that can be managed with good compilers and debuggers. Microsoft insists that COM's interface inheritance provides much of the reuse benefits without the risks of component breakage in a mass market desktop component environment. IBM asserts that any earlier complications that SOM's single-inheritance model put on a marketplace that wants to mix and match components from multiple suppliers was addressed by SOM 2.0, which supports multiple inheritance.

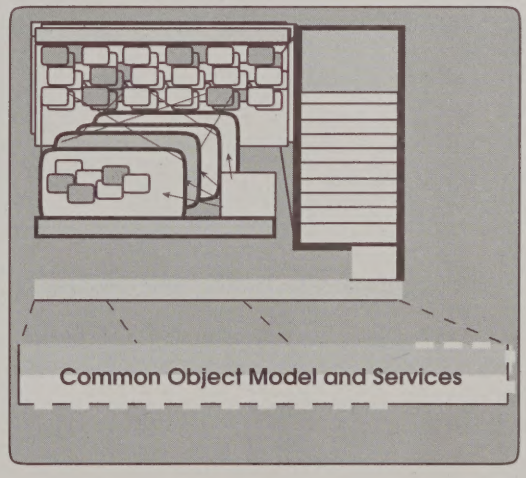
**Bottom line:** Although the limitation of programmers' freedom to inherit code from a COM base class is viewed as a significant negative by many from the object-oriented development community, for those just coming to objects from the mainstream PC development community, this restriction will not initially be a major issue. If it does become one, however, Microsoft may well be forced to provide implementation inheritance within COM (no Microsoft foes that we are aware of have asserted that this would be architecturally impossible).

### Support for Distributed Objects

IBM's SOM was initially developed to provide a model for support of object interaction within a single process — a limitation that IBM addressed by adding distributed object broker capability in the form of Distributed SOM (DSOM), which provides for communication among objects in various processes on the same or different systems. Today, developers are building systems that take advantage of the distributed object computing facilities of the SOM/DSOM infrastructure.

Microsoft's COM, as implemented today to support OLE 2.0, provides the capability to communicate among objects in the same or different processes on the same system. COM has not yet provided support of communication among distributed systems, although the proxy mechanism it uses to communicate between processes today provides an architecture for supporting distributed objects. Microsoft claims that replacement of the lightweight RPC used today with a network-capable (DCE-based) RPC, along with the addition of other distributed services (e.g., replication of

Common Object Services: Who'll Set the Standard?




*Source: IDC/Technology Investment Strategies, 1994*

object directories), will bring COM quickly and seamlessly into the distributed world. Indeed, Microsoft demonstrated what it called "distributed OLE" (presumably supported by a distributed COM) at 1994 Spring Comdex. This capability will become available to the developer community some time in 1995.

**Bottom line:** SOM (through DSOM) provides distributability across a network; COM does not. Both will do so by yearend 1995.

### *CORBA IDL vs. OSF DCE IDL*

As noted above (base operating systems), SOM is using OMG's CORBA IDL as its language-neutral interface definition language, while Microsoft is choosing to use an extended version of the Open Software Foundation's DCE IDL. IBM and the other CORBA supporters are embracing the CORBA IDL as the object interface, viewing the DCE-RPC as a lower-level and procedure-oriented language. Microsoft is extending DCE IDL itself to support the object world. (OSF may ultimately solve this problem by extending the DCE IDL with functionality that better maps to CORBA IDL in DCE Release 2 or a bit later.)

**Bottom line:** Short term, depend on bridges like Digital's ObjectBroker. Longer term, look for convergence between the OSF and OMG IDLs.

### *Multiplatform Support*

A very practical question for developers is: Which platforms will support the object model on which I develop? SOM has received support (although not necessarily to the exclusion of other object models) from major operating system and distributed computing suppliers Apple, Hewlett-Packard, SunSoft, Taligent, and Novell. IBM, of course, will provide SOM on OS/2, AIX, OS/400, and MVS. It is not surprising that Microsoft has indicated no interest in porting SOM onto Windows; Windows, however, is a vital target for IBM and/or its partners to port to. Expect it.

Microsoft has focused its multiplatform strategy on, naturally, providing COM/OLE first on the Windows family. It has also announced intent to work with Apple to bring COM/OLE to System 7, and Digital is working with Microsoft to port COM/OLE to DEC Alpha. What about the other Unix environments? Users will have to depend on suppliers other than the system vendors to port COM/OLE to Unix. Insignia, Locus, and Mainsoft are among the companies that are in the business of supporting Windows applications on Unix systems; as part of this mission, they will bring the OLE and COM APIs as well. Over the long term, ecumenical Unix system suppliers like Hewlett-Packard and ATT-GIS (formerly NCR) to support both environments. There has been no indication that COM will be made available on mainframes for the benefit of integrating with legacy systems.

**Bottom line:** It's generally preferable to develop an application on a system services layer that is actually supported or endorsed by the system supplier itself, rather than provided by a third party. Thus, the SOM story on Windows is currently weak, just as the COM story on Unix and mainframes is weak.

### *Application Development Toolset Support*

Both models are garnering significant support from the development tool community. SOM is being supported by Digitalk, Easel, Metaware, Objective, ParcPlace Systems, Sapiens, Symantec, Watcom, and others — mainly the C and object-oriented (C++) crowd, with the SmallTalk vendors expected to exploit SOM's forthcoming SmallTalk bindings. IBM itself is expected to extend SOM support to its visual programming tool, Visual Age, which has SmallTalk at its core; Visual Age will be able to exploit SOM's SmallTalk bindings.

COM/OLE support has been announced by Borland, Micro Focus, and Bluesky, as well as SOM/COM crossovers Metaware, Symantec, and Watcom. In addition, most leading "visual 4GL" suppliers, including Powersoft (PowerBuilder), Gupta (SQLWindows) and KnowledgeWare (ObjectView), are developing OLE 2.0 support in their next major releases. Novell's AppWare actually presents an alternative, albeit nascent,

component software model, and will reportedly provide for interfaces to both IBM's and Microsoft's environments.

An interesting challenge for Microsoft as a tool supplier is to bridge the transition from the hugely popular Visual Basic installed base of software components (VBXs) to the small, but more strategic OLE-based components (OCXs). The current Microsoft OCX development environment is C++, not a friendly environment to Visual Basic developers.

**Bottom line:** Vendors coming from the Unix (and some Windows) C and object-oriented programming world are jumping quickly on the SOM bandwagon, as it looks to be garnering a good level of support as a binary object exchange environment. COM support by toolset suppliers is coming as a pull-through phenomenon via OLE's success in the Windows programming tool world.

In both cases, whether a toolset supplier provides SOM support, COM support, or both predictably depends on what platforms the toolset supplier currently serves. The interesting activity to watch for is the crossover each model gets from the other's development tool community. The market opportunity that the Windows (and therefore, COM/OLE) world presents is certain to draw most of the SOM developers in time. The real question is how much support SOM can get from the Windows development tool community.

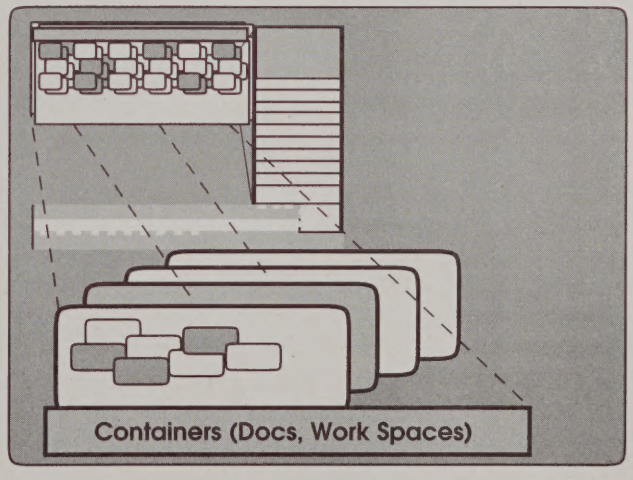
An amalgam of factors, technical and market driven, are at work in the battle between the major desktop (and eventually, distributed) object models/services. Microsoft is selling a model that is ostensibly less rich in object-oriented features. But the company clearly has significantly greater market clout than its object-model rivals. Our experience tells us that nontechnical factors such as installed base, marketing skill, and financial resources often overshadow technical shortcomings. If this were not the case, the Macintosh, not Windows and DOS, would be the PC market leader.

The power of the PC market to draw so much developer investment and deliver so much revenue, and the fact that so much of that market power is in Microsoft's hands, makes COM/OLE pretty much a given as a widely supported object platform. The good news for the SOM community is that SOM's growing support and early start in the marketplace give it a good chance to dilute Microsoft's Object Services share to less than the Windows and DOS combined 77% share of the base operating systems market. How much less? Driving Microsoft's share down by 10 points — meaning close to one-third of the market for SOM would be a huge and quite possible level of success.

## Container/Compound Document Architecture: OLE vs. OpenDoc

Above the object services layer in the component desktop model is the container or work space as the locus for application integration. This model defines the way that component-based software, within a single-user view/window, presents multiple types of information, makes all elements available for manipulation regardless of editor, and stores the content elements within the view in a single shared file. Such models typically build on top of the services provided by an underlying object model. For example, OLE uses the object naming, storage, and messaging services provided by COM,

Container Architecture: OLE vs. OpenDoc




*Source: IDC/Technology Investment Strategies, 1994*

and adds capabilities such as drag-and-drop and in-place editing, which are specific to the user view/container environment.

The most widely recognized type of desktop "container" is the compound document. And the leading competitive compound document architectures are Microsoft's Object Linking and Embedding (OLE), which uses the services of the Component Object Model (COM), and Component Integration Labs' (CIL) OpenDoc, which builds on the services of SOM/DSOM. Component Integration Labs is an organization founded by Apple, IBM, and WordPerfect/Novell.

These architectures are less than full object-oriented frameworks, not offering the extensibility of a true framework (e.g., Taligent). What they do provide is a supplier-defined (Microsoft and CLI) object-oriented interface between independently developed applications or application components. Both architectures are fairly static, controlled by the suppliers that have defined them. The benefit is that they provide an entree into the concept of component software without the requirement of complete proficiency in object-oriented programming. Call them partial steps toward the wide-open, user-customizable, and extensible desktop.

But compound document architectures are critical to the vendors promoting them and the underlying object models. Many application developers see the compound document environments as the first really practical and valuable quasi frameworks available on top of desktop object models. For many developers, particularly those coming from the PC development community, the discussions of object orientation, SOM, COM, Taligent, and other services are too esoteric and remote to be of practical value today. Thus, OpenDoc and OLE are the critical forward elements of the object camps' campaigns to influence/control the emerging component-based desktop.

Which will be successful? (Both?) That depends more on specific features. The following are major differences between these rivals:

- **Level of programming abstraction.** The consistent feedback from developers since the introduction of OLE 1.0 has been that Microsoft has some work to do to simplify access to OLE functions. Microsoft's best bet in rectifying the situation is to enlist the help of tool suppliers (like Metaphor, with its Capsule product) to mask the OLE interfaces under the covers of higher-level programming tools. OpenDoc will undoubtedly benefit from the same phenomenon over time, but it is starting out with the advantage of APIs that are at a higher level of abstraction.

- **Cross-platform support.** This is an area where the CLI folks have trumpeted an advantage for OpenDoc. But, as in the case with SOM vs. COM, Microsoft is making OLE available on the platforms that matter on the desktop (in terms of market share) — Windows and Macintosh. OpenDoc is planned for those plus OS/2 and several variants of Unix. Does availability of OpenDoc on OS/2 and Unix desktops give much of an edge to CLI and its founders? We doubt it.

- **Irregular content shape.** OLE supports only rectangular-shaped content, whereas OpenDoc supports irregularly shaped "parts." The issue is not a really big one compared with the rest, but score at least a small advantage for OpenDoc.

- **Compound document storage.** OpenDoc provides a richer mixed-content storage system. Bento, an Apple contribution, is designed with the concept of a whole made up of distinct parts (hence the name Bento, after the Japanese lunch boxes with neat compartments). In contrast, OLE uses the standard Windows/DOS file systems, due to be replaced or augmented with a distributed object storage system in Cairo (version of Windows NT due in 1995). The plan to move to an object store is a concession by Microsoft on this point.

- **User interface.** The user interface in OpenDoc appears to be more dynamic. In OpenDoc, all parts are active — one can immediately edit them by moving a cursor on them (vs. a double-click to activate in

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OLE). OpenDoc allows for more than one object at a time to be active.

- **Scripting/macro language facilities.** Scripting is a critical element for allowing end users or developers to automate the interaction of several applications to complete a particular task. This is a form of automated workflow, a core aspect of the next generation of business applications. Microsoft has introduced the OLE Automation interface to support this and is pushing Visual Basic for Applications (VBA) as a common scripting or macro language within its major desktop applications. The tremendous support for Visual Basic within the developer and power-user environment gives Microsoft a large built-in base of trained VBA users. OpenDoc features the Open Scripting Architecture, which provides a base from which various scripting languages may be used to automate workflows around OpenDoc documents. The open aspect of OSA is appealing but will take time to fully implement. Interestingly, CLI is offering an interface between OSA and the OLE 2.0 Automation interface.

Does OpenDoc present a functionally better compound document architecture? At first blush, the answer appears to be yes. But whether the marketplace will view it as marginally or significantly so is not yet clear.

OpenDoc's lead will narrow over the next two years. The programming interface advantage of OpenDoc may become diminished for many developers by the front-ending of OLE by popular high-level programming tools. And the multi-platform advantage for OpenDoc is not a compelling one, except for OS/2 shops and the Unix desktops that Locus, Mainsoft, Insignia, and other companies don't address. That leaves a small window of opportunity for CLI and its partners to build some OpenDoc momentum.

Recognizing the market realities, CLI has stated that OpenDoc will provide interoperability with OLE, allowing OLE developers to run in an OpenDoc environment. But will developers take the big leap of using OpenDoc's additional (non-OLE) features and thus link themselves tightly to OpenDoc's fate? In many ways this is a repeat of the OS/2 vs. Windows question: providing Windows support on OS/2 allowed users to try OS/2 without abandoning the Windows investment — an essential if OS/2 was even to compete. But was the functionality of OS/2 enticing enough to cause a large number of customers to abandon the Microsoft market share security blanket? The answer is obviously no. In the next two years it will be OpenDoc's chance to entice a large number of customers to make that leap away from Microsoft — a tall, albeit not impossible, order.

## Conclusions: Implications for Users and Developers

The end result — a component-based desktop that facilitates integration around the individual's work model — will be much more responsive to users' and business needs than today's "stovepipe" application-centric model. The challenge will be for all interested parties — individuals, IS departments, independent software developers, and system vendors — to get there while avoiding a horrific transition. This will require making the right choices.

For users and developers, therefore, it will be important to keep the following points in mind as the component desktop evolves during the next five years:

- **Yes, Microsoft is the "safe" bet for the short term.** Virtually every vendor who is proposing an alternative to a Microsoft-sponsored standard is agreeing to provide support for Microsoft's standard alongside its own, an acknowledgment that Microsoft's standard will at least be one of the winners. This effectively tells developers and users that Microsoft is the safe choice.

- **But remember, IBM and others were once on top, too.** Microsoft is not likely to dominate this environment forever, an obvious conclusion for anyone observing the computer industry's history. Thus, blind acceptance of Microsoft standards and technologies becomes riskier as we move out in time. Alternatives

like SOM, the CORBA-compliant Distributed Object platforms, OpenDoc, NeXT, and Taligent merit careful analysis as potential breakthrough platforms.

- **The marketplace does not really care about technology**. In the next year or two, while vendors debate and wage obscure battles over the purity of object models, remember: users don't generally care about the technological niceties. A competitive technology, coupled with clear communication of functionality and a strong base of supporting applications, will beat any marginal technology edge. Avoid vendors and standards that get too focused on the technological detail.

- **Hardwired desktop integration (e.g., office suites) is a short-term fix.** The real goal of the component desktop is to allow mix and match of best-of-breed applications and application components. Today's focus on picking the right suite — Microsoft's, WordPerfect's, Lotus's — is a short-term phenomenon, just as minicomputer-based integrated office packages were.

- **The transition to new object-oriented operating systems is going to be evolutionary.** The tack that the desktop systems vendors are taking is to slide an object-services layer on top of existing desktop operating systems, as a bridge to fully object-oriented OSs. The good news in this approach is coexistence. The ability to maintain procedural applications as object/component-oriented applications begins to come available. In three years, we will still be looking at Windows (the latest release), MacOS (as part of PowerOpen), and OS/2 (perhaps on Workplace OS).

- **But the transition to object-oriented applications will be rapid.** The flip side of the object OS transition strategy is that it will allow developers to create object-oriented applications sooner (on current OSs) rather than later (on object-oriented OSs). Development toolsets that support SOM and OLE 2.0/COM are already showing up. Support for OpenDoc parts will be integrated into toolsets over the next year. This will mean that skill sets will need to be updated in the short term to take full advantage of the component desktop model.

- **The center of the application development universe is clearly shifting to the desktop (and workgroup).** For some corporate application development staffs and mainframe- and mini-era commercial software suppliers, this idea may seem a little strange. Yet all the recent trends in spending and new technology creation point to the desktop as the focal point for the next generation of business systems.

This last point is, perhaps, the most important one. The desktop offers the user interface and, increasingly, the integration capability to provide the focal point for developers of these systems. This is not to say that all code and data should reside on the desktop. On the contrary, our research indicates that for large transaction-oriented applications, the desktop is the worst place to put code and data.

Our point is that in the past when PCs attached to servers they attached according to the servers' rules (3270, HLLAPI, LU6.2, etc.). In the future, it will be the servers that are striving to attach to the desktop world by the desktop's rules. This is truly the IT industry's version of the Copernican Revolution. And it is also why so many vendors are struggling mightily to set the desktop's rules. We hope that in the short term the rules that prevail are the ones that are in the users' interests; happily, in the long term, the rules of the marketplace will make that so.

— This article was researched and written by Frank Gens, vice president, Technology Investment Strategy Corporation. Please contact (508) 935-4268 for more information.

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# 1994 Preliminary Recap: Strongest Growth in PCs, LAN Servers, Software, and Storage

Faster-than-expected growth in some of the most significant information technology (IT) industry markets — personal computers, PC products, and software, among others — is responsible for a strong 1994 IT showing, according to preliminary estimates. Among the fastest-growing markets surpassing IDC's optimistic forecast for 1994 were application software, services, and PCs. Some high points from 1994 are the following:

- Sales of personal computers again soared past expectations on the way to recording astonishing 28% unit growth in 1994 over 1993, driven by solid demand from business users and by waves of consumer purchases.
- LAN servers again represent a rapidly increasing portion of commercial systems sales, growing by 28% in unit shipments and 27% in revenue. Growth was fueled by sales of LAN servers as core IT building blocks to user organizations of all sizes in virtually all vertical market segments worldwide.
- Overall software industry growth totaled more than 11%, led by higher-than-expected growth in applications.
- Advanced operating-environment database RDBMS revenue grew by more than 50%, driven by strong Unix sales.

In other market segments the news may not have been quite as good, but still was not bad. Revenue from services grew slightly, and mainframe sales declined slightly. Prospects in each market remain solid, if not spectacular:

- The mainframe market declined by 3–5% in 1994, significantly less than the 7–8% decline IDC forecasted one year ago. The lack of viable mainframe alternatives and customer recognition that mainframe cost-to-

January 13, 1995 Vol. 30, No. 3-4

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use remains competitive in specific processing environments will likely bolster, if not stabilize, mainframe revenues over the next 12 months.

- The worldwide market for services saw nearly 5% growth in 1994 from 1993, driven by several rapidly growing segments.
- Demand for operational services continues to exceed supply. Revenue from operational services grew by approximately 17% in 1994.
- Users continue to invest in training and educational services; they grew by approximately 11% in 1994.

In the following pages we provide a review of the 1994 IT market. Information in this issue of *The Gray Sheet* comes from IDC's preliminary analysis of a range of IT market segments from PCs to mainframes and from high-end databases to PC operating systems. *The Gray Sheet* will include a complete fiscal yearend wrap-up as financial results for 1994 are disclosed during the first quarter of 1995.

# 1994 PC Market Overview

PC shipments in 1994 will likely exceed those of 1993 by at least 25%. IDC's PC Hardware Program analysts are raising forecasts of PC unit shipments in the United States for 1994 to 18.4 million, up from 17.1 million, and worldwide estimates to 48.5 million from 44.3 million.

In addition, revenue increases for most leading vendors again outpaced unit shipment growth. Average selling prices were pushed up by a shift toward faster processors and purchases of systems with larger disks, more RAM, CD-ROM, sound cards, and multimedia software. The following factors account for the unit increase:

- **Higher sales in ROW.** Updated estimates from around the world support higher sales in a number of areas. Asia/Pacific shipments will exceed our earlier forecasts, with particular strength in Korea. Our estimates for Eastern Europe have also been raised, thanks to improving economic conditions in several former communist countries.
- **Booming retail demand.** Nearly all vendors selling into the U.S. retail channel report that their fourth quarter shipments of PCs will be limited only by their ability to produce them. This is particularly true for Pentium systems, which have been selling very strongly. Compaq's decision not to sell any Pentium systems at retail this quarter and IBM's conservative production of Aptivas have left the other leading manufacturers (Packard Bell, Acer, AST, AT&T) scrambling to keep up with orders.
- **Robust U.S. economic growth.** The recent U.S. interest rate hikes seem to have had little impact on spending so far. Revised government figures show that Gross Domestic Product (GDP) grew 3.9% in the third quarter. Consumer confidence in November jumped by the largest one-month increment ever. Early reports on the holiday selling season indicate a significant rise in spending compared to 1993.
- **Business sales remaining healthy.** Business-oriented vendors such as Hewlett-Packard and Digital expect record sales in the fourth quarter, far surpassing previous peaks. This outlook is supported by a recent dealer survey that showed strong sales in October and very high expectations for the next 90 days.

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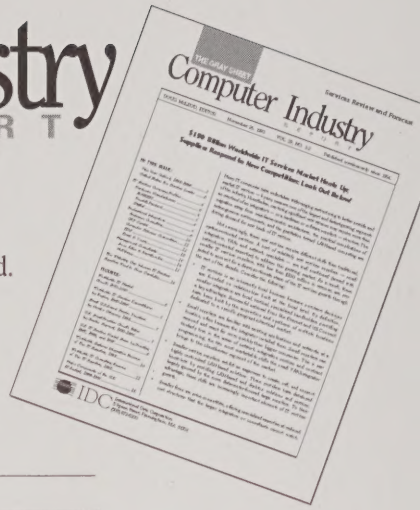


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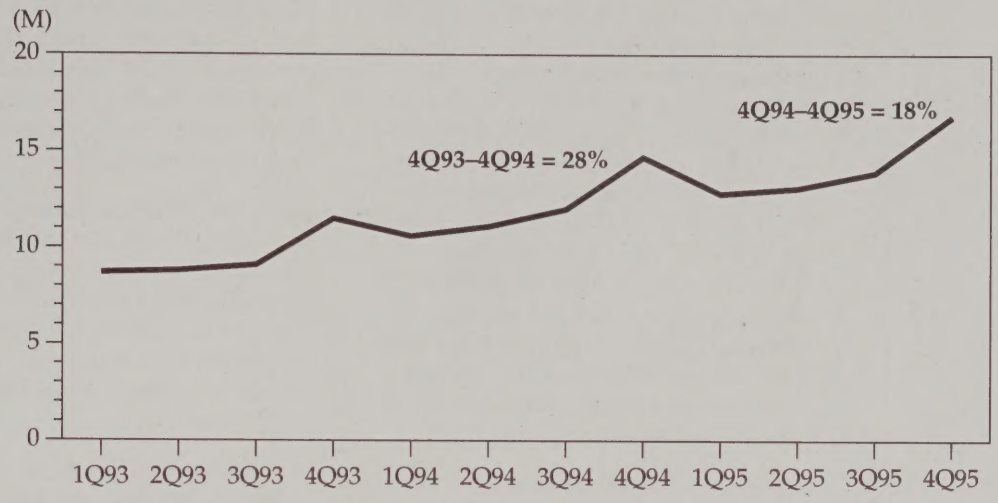



*Source: International Data Corporation, 1995*

- **Clonemakers hanging on.** IDC has been conducting additional research into the performance of lesser-known vendors. These include both national mail-order firms and local "screwdriver shops" that build PCs to order from commodity components. The results so far indicate that the shakeout that was rampant during 1993 among the ranks of these vendors has subsided. Their sales, which had been shrinking as 1993 progressed, appear to have stabilized on an absolute basis. While the leading vendors continue to pick up market share, the pace of those gains is slowing as the stronger of the smaller vendors maintain and in some cases grow their sales.

- **Strong chip and disk orders.** Reports from microprocessor and hard-disk vendors indicate higher PC shipments than could be accounted for by our previous estimates. Recent discussions with leading suppliers to the PC industry indicate an acceleration of orders in the last two months as PC vendors scramble to keep up with demand.

- **A better-than-expected third quarter.** Packard Bell, Compaq, Apple, Acer, AT&T, and others had very strong quarters in the United States. Our shipment estimate for the third quarter is 4.784 million, up from the 4.312 million previously forecast. Based on data from our offices in the Asia/Pacific region, we have adjusted the seasonal pattern for those countries, strengthening the second and third quarters at the expense of the first. This contributed to an increase in our estimate of 12.016 million for 3Q94 worldwide shipments, up from 10.632 previously forecast.

## Top Ten Vendors in 1994

**Compaq** will likely lead the industry, both in the United States and worldwide, maintaining its year-to-date position. The company is one of the top three in all form factors — desktops, portables, and servers — with strong product lines in each area serving both the premium and value segments. The recent controversy over Pentium, combined with very strong fourth-quarter demand, means that Compaq's omission of Pentium-based systems from its consumer lineup is unlikely to severely crimp its sales.

**IBM**, the worldwide leader for many years, this year will likely slip to second place and fourth place in the United States. In past years IBM has had a huge fourth quarter because normal seasonal factors were exaggerated by its sales force's closing of yearend business to

meet quotas and special marketing programs that encouraged dealers to stock up on IBM products. Although many of those factors are still operating, this year's fourth quarter will not produce as prominent a spike in sales and indeed shipments will be below 1993's. The reason can be found in recent history. IBM and its resellers ended 1993 overstuffed with inventory that had to be sold off at discounts in 1994. This year the new management of the PC Co. is being very cautious about inventory levels, so that shipments, rather than outrunning demand as in prior fourth quarters, will likely fall behind in a number of areas. This situation will limit both IBM's inventory risk and its unit shipment results.

**Apple** slipped from number one in the United States to a fairly close number two, due primarily to a weak first quarter and a flat year in portables. The short-term outlook for Apple is positive. The vendor's product line has been refreshed almost from top-to-bottom since last spring and is the strongest and most competitive in years. Shipments of the Power Macintosh are picking up steam as more native software becomes available, and the multimedia-oriented 630 line appears to be an across-the-board hit in its business, consumer, and education versions. The main short-term problem facing Apple is its renowned inability to match supply and demand, with supplies of the 630 and the PowerBook 500 series remaining tight.

The leader in the U.S. retail channel, **Packard Bell**, is gaining share as that channel grows in importance. The privately held company has done well by offering a full range of PC systems, from $999 low-end boxes to 90MHz Pentium systems. Recent indications are that Packard Bell is doing well in the critical fall selling season and that Pentium systems (both 60MHz and 90MHz) will make up 20% or more of its unit sales. The short-term forecast for Packard Bell would be even higher except that it appears that it may have trouble fully meeting demand. Packard Bell will be either No. 1 or No. 2 in desktop sales in the United States, a remarkable achievement.

**NEC**, the largest Japanese PC vendor and No. 5 in the world, is benefiting from the resurgence of PC sales in that country. However, it is losing market share in Japan to competitors backing open standards (NEC has mostly proprietary systems). NEC has little presence outside its home country except in the United States, where notebook shipments are strong.

**Gateway 2000** is the leading U.S. direct-marketing PC vendor and fifth overall. The company has been experiencing growing pains as it broadens its reach to overseas markets. IDC expects that Gateway will have a strong year's end as it makes increasing inroads into the "family PC" market.

In the second half of the Top 10, **Dell** will bounce back from a number of miscues and should finally start growing in terms of units. The direct-marketing company is placing increasing emphasis on Pentium PCs and stands to gain share from IBM, Compaq, and HP if the corporate market starts to shift more quickly to Intel's latest and greatest. Notwithstanding that possibility, HP is expected to maintain its momentum and rise to No. 9 worldwide, a notable ascent from No. 17 in 1992. AST has run into trouble recently and will probably spend the next several months recovering from recent operational problems. Its branded sales should rise somewhat now that Radio Shack is carrying AST-brand PCs, but OEM sales (not included in our unit count) are vanishing as Tandy, Dell, and others phase out purchases.

Other vendors that are likely to do well through the end of the year are Toshiba, Acer, AT&T, and Digital. Toshiba is riding the portable wave, and increased supplies of color active-matrix screens should allow it to grow volumes substantially. Acer is hitting it big in the consumer channel and is seeing especially strong demand (>50% of units in the fourth quarter) for Pentium systems. AT&T has surged recently, thanks to a revamped product line and broader distribution. Digital, while likely to end the year No. 12 in the United States, is continuing to grow, partly on the strength of a revamped premium business line and new consumer-oriented PCs.

## PC Outlook for 1995

In the United States, IDC expects nearly 18% growth due to four basic reasons:

- The strong U.S. economy
- The speedup of replacement purchasing because of rapid improvements in price performance
- Increasing acceptance of the PC as a home appliance
- The momentum from the 1994 yearend buying spree

For the worldwide market, IDC is forecasting growth of 17%. This is a direct result of the rapidly growing U.S. market, along with minor changes to the growth pattern in the rest of the world. The total PC shipment forecast is up substantially because both the growth rate and the 1994 base have been increased.

IDC's PC Hardware Program and *The Gray Sheet* will publish complete forecasts, with processor splits and more years of data, in early 1995.

*— Written and researched by members of IDC's PC Hardware Program, including Eric Lewis.*

# LAN Server Market's Growth Continues

During 1994, the LAN server market continued on its phenomenal growth path, increasing 28% from 1993 to 1994 in worldwide shipments and 27% in worldwide revenues. This growth is driven by the continuing investment in LANs as core IT building blocks by companies of virtually all sizes, within all industries, and across all geographic regions. The trend to downsize and implement more robust applications on LANs is another key reason for healthy LAN server market growth over the past year.

The reigning champion of the LAN server market is Compaq. During 1994, the company maintained a leadership position although many new entrants and an aggressive year by HP diluted Compaq's PC-server share slightly. IDC believes that Compaq will continue to be a formidable competitor and the "one to watch" in the LAN server space during 1995.

The competitive bar within the LAN server space is rising. Barriers to entry are much steeper now than they were 12 months ago. Software expertise (systems management, ISV relationships, and ease-of-use tools), service and support infrastructure, and cost-effective low-end solutions are the key investments that systems and PC vendors need to make in 1995 to reap the potentially huge opportunities within the LAN server market.

The key market trends that shaped the LAN server market during 1994 include the following:

- **Unabated growth.** Worldwide LAN shipment growth continued in the 20%+ range from 1993 to 1994. With the server at the heart of every LAN, LAN installation growth directly affects LAN server growth.
- **The networking of small and medium-sized businesses and remote sites.** During 1994, LAN server sales were active into small and medium-sized companies and within remote sites of larger corporations. Consequently, sales of low-end servers (Compaq's ProSignia VS, IBM's PC Server, and HP's LC) were particularly robust during the second half of 1994. Additionally, remote systems management products enabling the control and monitoring of LAN servers at remote locations became a competitive differentiator during 1994. This was in direct response to increased remote-site connectivity.
- **Tremendous growth potential from markets outside the United States and Western Europe.** During 1994, countries within the Asia Pacific region, Latin America, and Eastern Europe showed significant LAN

server market growth. LAN server shipments to countries outside the United States and Western Europe grew almost 40% from 1993 to 1994, compared to 24% and 27% growth inside the United States and Western Europe, respectively.

- **The increasing size of LANs.** Shipments of PCs into corporations continued to increase during 1994, and the rate of PC connectivity to LANs continued to rise. The average size of networks, consequently, grew during the last year to 16.8 nodes in 1994, up from 15.1 in 1993.

  These growing networks are demanding more performance, storage, and memory from their servers. The average LAN server bulked up over the last year, with the most prominent changes being the switch to Pentium and PCI. Additionally, server configurations with 16MB to 32MB RAM and 1GB to 2GB of storage became more common throughout the year.

- **LAN servers moving upstream.** Although LAN servers are still installed primarily for file and print services, application servers are becoming a larger portion of the overall LAN server market. During 1994, database and e-mail applications were popular LAN server applications. Other applications infiltrating the LAN server space include workgroup and remote access. Application servers now comprise 26% of worldwide LAN server sales. This is up from 22% in 1993.

- **Changing procurement patterns.** As LAN server platforms begin to take on additional tasks beyond file and print services, IDC has identified changes in the procurement process. During 1994, IS involvement with the purchase, installation, and management of LANs began to shape high-end LAN server product development, channel strategies, and marketing messages. Systems management products, new rack-mount products, and redundant hardware components were the key high-end enhancements during 1994. Direct selling teams to work with VARs (HP) and expanded ISV relationships (Compaq) were other strategies that became competitive differentiators in 1994.

## LAN Server Market Growth: The Shining Star of the Systems Market

As these trends shape the LAN server space, the market is evolving into one of the fastest-growing and competitive ones in the IT industry. During 1994, the LAN server market experienced significant growth. Worldwide shipments grew at 28% from 1993 to 1994, with 1.39 million new servers shipping worldwide in 1994. Revenue growth was also robust, increasing 27% and reaching almost $8.2 billion worldwide.

Revenue growth rates in the LAN server market were bolstered by stable average configuration values (ACVs). ACVs remained in the $6,100 range even though prices for mass storage, memory, and processors dropped during 1994. ACVs are stable due to users purchasing higher-end LAN server platforms. The average storage on LAN servers has almost quadrupled in the last two years from 500MB in 1992 to almost 2GB this year. The switch to Pentium in 1994 also drove up ACVs.

## Competition Heats Up with Compaq at the Helm

Competition within the PC server market continued to intensify in 1994 as the leading vendors repositioned themselves and as new vendors entered the market. During 1994 major PC server product announcements came from all of the established vendors (Compaq, IBM, HP, Dell, and AST), as well as from players that are less well known in the PC server space (Acer, Apple, ALR, AT&T GIS, Digital, and Zenith).

Compaq established itself as the clear leader in 1994, with 29.1% market share in worldwide PC server shipments, pulling away from IBM, with 18.0% market share. Compaq made several key announcements that solidified its number one position. The company improved its systems management software (Insight Manager), introducing remote asynch capabilities, adding NOS support (OS/2 LAN Manager and NT Server), and better integrating systems management into SmartStart. Compaq also expanded SmartStart to include middleware software (Oracle 7.0 and Microsoft SQL Server). SmartStart and Compaq's other ISV marketing programs have been clear competitive differentiators for the company. IDC believes that Compaq will be tough to beat in the coming year.

IBM remained the second largest supplier of LAN server products during 1994 with 18% market share. The company spent much of late 1993 and early 1994 regrouping and introduced its first EISA products in mid-1994. IBM's competitive advantages include NetFinity (best-in-class LAN server management), good relationships with IS, and the potential to leverage systems expertise from the RS/6000 group. IBM, however, needs better marketing programs for its products and to expand its ISV relationships.

HP, the number three LAN server supplier, improved its market share to just under 15% in 1994, up from 10% in 1993. IDC believes that HP's success is due to the company's aggressively priced low-end products (NetServer LC), systems management offerings, and the leverage the company brings from other parts of HP's systems business (service/support infrastructure, corporate accounts program, and HP 9000 and OpenView expertise). If either Compaq or IBM stumble in the coming year, IDC believes that HP could gain significant market share.

Worldwide LAN Server Shipments and Revenue, 1992–1994

| | 1992 | 1993 | 1994 |
|---|---|---|---|
| Shipments | 848,878 | 1,087,837 | 1,387,074 |
| % growth | 45 | 28 | 28 |
| Revenues ($M) | 5,230.8 | 6,657.7 | 8,164.0 |
| % growth | 25 | 27 | 23 |
| ACV ($) | 6162 | 6120 | 5886 |
| Installed Base | 2,813,966 | 3,760,830 | 4,840,048 |
| % growth | 40 | 34 | 29 |

*Source: International Data Corporation, 1995*

After HP, share drops dramatically, with many vendors vying for fourth place. AST, Dell, Apple, Digital, Acer, Zenith, and AT&T GIS are all extremely close in market share.

## Invest NOW

The time to get aggressive in the LAN server market is now. IDC predicts healthy revenue growth in the LAN server market over the next few years, increasing at more than 20% in worldwide revenues from 1993 through 1998. This is especially attractive to PC vendors given shrinking PC margins and to systems suppliers given limited overall midrange growth.

The barriers to entry into the LAN server space, however, are rising. Investments that are made within the next 12 months will largely determine who will be successful in the LAN server market as it grows to become a more substantial component of the overall systems market.

*— Written and researched by members of IDC's Commercial Systems Program, including Susan M. Frankle.*

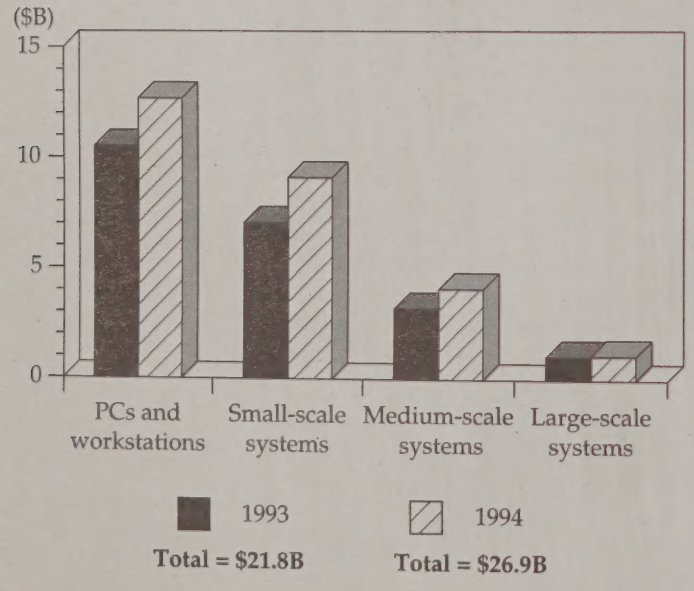
# Unix Systems Market Continues Healthy Worldwide Growth

The Unix systems market recovered sharply in 1994 and enters 1995 with good momentum. HP looks like a world beater, IBM should accelerate, and Digital has surprisingly good Unix growth. The increasing concentration of midrange market share into the hands of the top four leading vendors (HP, IBM, AT&T, and Sun) may slow in 1995 because most vendors should do well in the business climate ahead.

## 1994: Stronger than Expected

The Unix hardware market nearly doubled IDC's 1994 forecast to grow more than 20% in systems revenues. The Unix market exhibited robust and balanced growth in all size classes except large-scale systems. A reinvigorated Unix PC and workstation segment grew 21%, and small-scale systems also grew 29%. Medium-scale systems slowed from their torrid pace in 1993 to grow 28%.

Worldwide Unix Systems Revenue, 1993–1994*




*Preliminary estimates ($M). System value includes value of CPUs and basic peripherals; e.g., data storage devices, terminals and printers.

*Source: International Data Corporation, 1995*

HP continued its strong PA-RISC system product cycle. Its flagship Unix server line, the 9000 Series 800, grew 46% — in the Unix midrange overall it grew 40% (the remnants of the Unix server business purchased from Texas Instruments converting to the Series 800 accounted for this difference). HP exhibited solid strength in each market segment in which it competed.

Sun rose fastest among the top players in the Unix midrange fueled by rapid growth in small-scale systems. Its growth in workstations continues to be slow. IBM, SGI, and Digital captured the lion's share of the workstation growth.

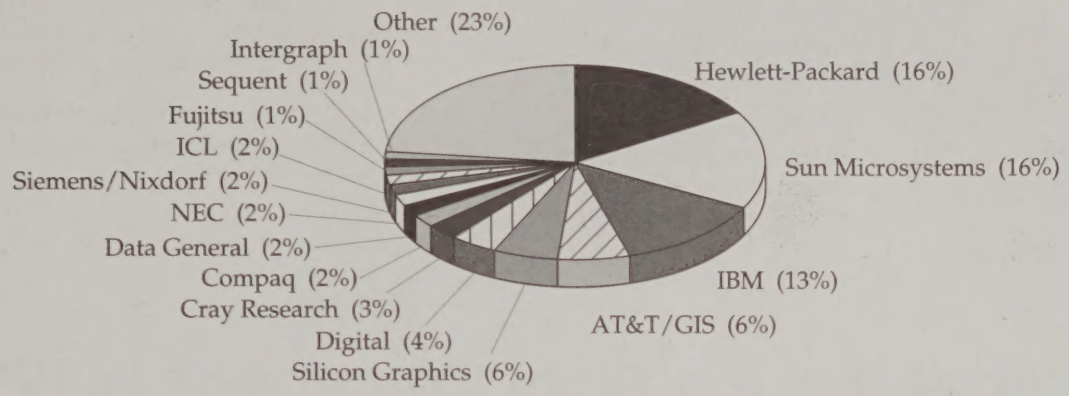
In 1994, IBM suffered the lack of SMP capability at the top of its RS/6000 line, and its medium-scale revenue growth trailed the other major vendors. The company should finally benefit from its long-delayed SMP product, due to ship in early 1995. Because SMP reliability and performance tuning could take up to six months, SMP sales volumes will have an extended ramp-up during 1995.

Among the system vendors, Digital's conversion of its installed base appears to be fueling its rapid growth in the low end of the Unix market. The company had among the highest growth rates for vendors in workstations and in small-scale systems. If it can build on this trend, a Digital recovery may be imminent.

## Midrange Near-Term Outlook

Sun faces severe challenges in 1995. Preliminary 1994 estimates show it to be in a virtual tie with HP for the overall Unix market share leadership. Sun's Unix growth has slowed below the overall Unix market growth rate even as HP and IBM steadily gain product and market momentum. Sun's brightest hope lies in the strong market reception for its multi-user server products. Sun will need very strong growth in midrange systems as well as improved workstation results in order to regain its historical growth rates.

Worldwide Unix Systems Leaders, 1994*




**1994 WW Total Unix: $26.9 billion**

*Preliminary estimates ($M). System value includes value of CPUs and basic peripherals; e.g., data storage devices, terminals and printers.

*Source: International Data Corporation, 1995*

In early 1995, IDC expects HP to enhance its server line with a new hardware release. A major focus of the announcement will be the release of HP-UX 10.0, which had slipped through 1994. We expect HP-UX 10.0 to rationalize HP's workstation and server operating systems and provide enhanced SMP support. The new products will maintain HP's continued Unix growth.

The recently announced IBM RS/6000 SMP systems, which will ramp up shipments in 1995, have great potential impact on competition in the Unix market. Their arrival will start to put downward pricing pressure on the high end of competitor product lines. These systems, as with any new SMP servers, will likely require performance tuning over the first half of the year. How smoothly this process goes will greatly affect their 1995 results. However, uniprocessor sales will benefit immediately from the presence of the SMP growth path.

A resurgent AT&T with its "Customer Focused Solutions" marketing strategy and Sequent with its "Enterprise Architecture" sales model seem to be at the forefront of a movement toward providing "solutions for customer problems." At AT&T this takes the form of complete solutions for vertical applications in target markets. Sequent, on the other hand, focuses on process — that is, guiding customers through transitions, as from a mainframe-centered architecture to a business-goal-directed architecture. These two approaches contrast with the traditional hardware technology and performance sell still prevalent among most other platform vendors.

The improving worldwide economy in 1995 gives an opportunity for many long-suffering Unix vendors to recover from the pains of the worldwide recession of the past few years. The increasing concentration of server market share into the hands of the top four midrange vendors (HP, IBM, AT&T, and Sun), which IDC has observed over the past few years, may slow in 1995 because most vendors should do well in the improving business climate.

## Highlights for 1995

Over the next six months the following trends will play a key role in shaping the market for Unix systems:

- The continuing rollout of dedicated, specially configured server products will intensify competition in the database server and network server markets.
- Though PC-based servers will continue to exert downward pricing

pressure on low-end Unix hardware, the introduction of new low-cost workstations and small-scale systems appears to be successfully blunting the incursion of PC-based servers.

- The NT threat to Unix servers has seemingly slipped another year, but continues to loom large. AT&T is the most aggressive and successful direct-sales player with Windows NT.
- Potential winners over the next six months should be Sun servers, IBM RS/6000 systems, and HP platforms.

*— Written and researched by members of IDC's Unix and AOE group, including Gene Lee.*

# Mainframes Make a Slight Comeback in 1994

The large-scale systems market experienced revenue decline of 3–5% in 1994 from 1993 levels. This is considerably better than expected earlier in the year when IDC's forecast suggested a 7–8% decline. The more favorable forecast is based on the following factors:

- Improved economies in specific regions of the world, including the United States and particular countries in Europe
- Customer recognition that Costs-to-Use for running certain workloads on a mainframe are very competitive when compared to midrange alternatives
- Stabilized prices from IBM's and Hitachi Data Systems' inability to meet demand requirements
- Migration costs and lack of viable alternatives to supporting high-volume online transaction processing (OLTP) applications remaining as barriers to moving some mainframe applications.

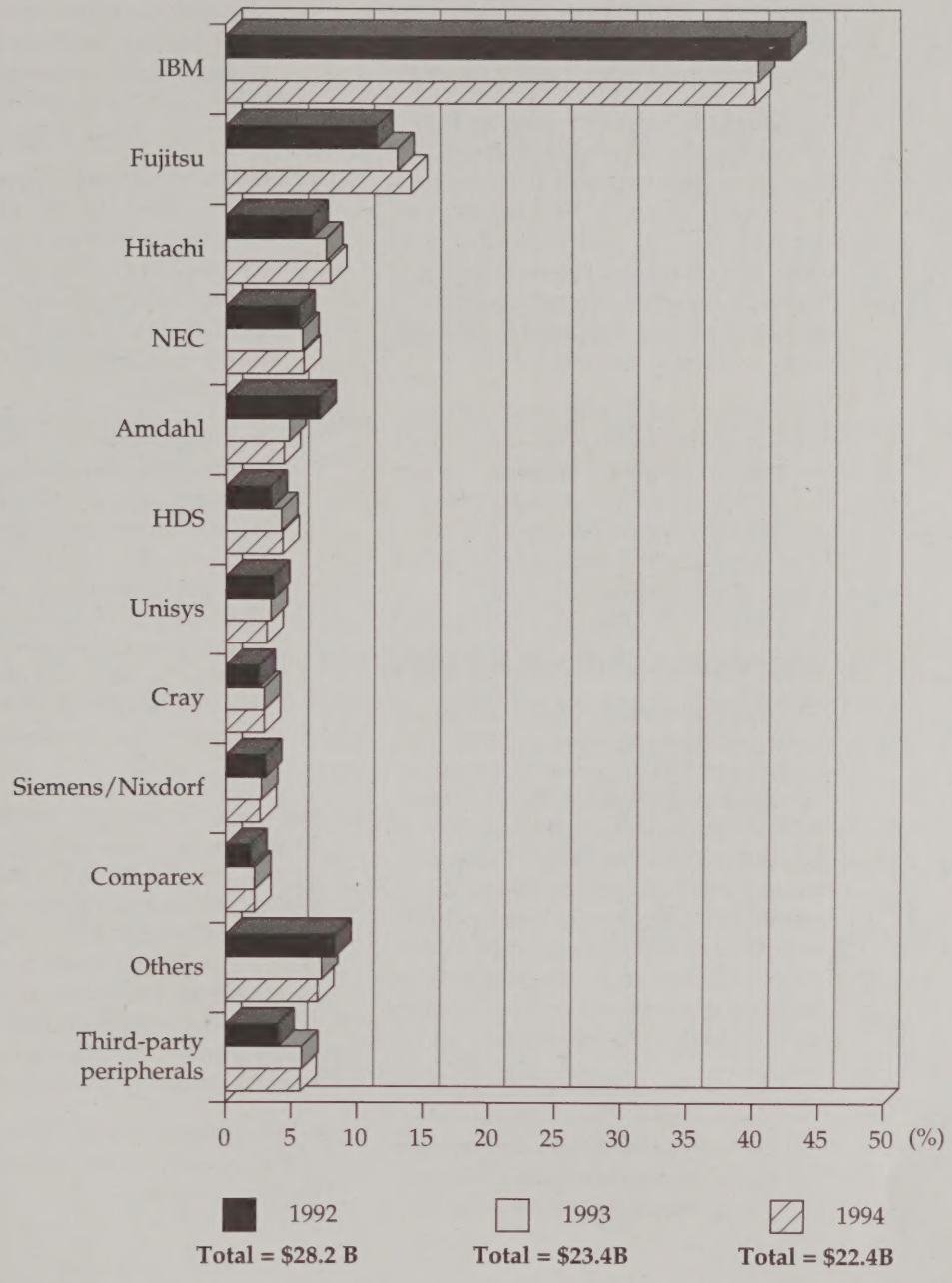
High-end storage revenues are also expected to decline marginally less than original estimates indicated. Although pricing pressures continue to be more dramatic for storage subsystems, demand has remained relatively constant, and the impact of storage revenues on the overall large-scale market will have a negative impact of approximately 6% in 1994.

The majority of the large-scale revenue decline can be attributed to reductions in IBM and plug-compatible-manufacturer (PCM) performance for the year. This situation is due to a couple of key factors: (1) IBM and the PCMs make up over 55% of the large-scale market and (2) the effect of positive currency conversion rates for Japanese vendor revenues artificially increases the year-to-year U.S. dollar growth rates.

## Mainframe Vendor Profiles

As the dominant vendor in the large-scale market, IBM product introductions and transition strategies have the greatest impact on the market conditions. The year has proved to be very active and productive for IBM with the introduction of its S/390 parallel transaction, query, and enterprise servers. Based on many of the factors alluded to earlier, IBM has been a major beneficiary of increased customer spending for mainframe capacity. Additionally, the new S/390 parallel transaction servers combined with new software pricing structures are generating interest from customers that had previously been searching for a way to control the escalating costs of running mainframe applications. In the last quarter of 1994, IBM's manufacturing capacity is exceeded by demand for 711-based technology, and some deliveries to customers are being pushed out into first and second quarter of 1995. IBM's S/390 storage revenue is expected to be down as much as 25% from 1993 levels, offsetting some of the improvement in water-cooled system shipments.

Worldwide Mainframe Systems Market Share, 1992–1994




*Source: International Data Corporation, 1995*

Hitachi Data Systems is expected to perform at market levels. We believe that many customers now look to HDS as the top PCM when considering alternatives to IBM solutions. Although the company's storage revenues are expected to decline as much as 20% year-over-year, IDC believes HDS is also the beneficiary of increased demand for mainframe MIPS, and this demand will offset falling storage revenues.

One of the major bright spots in the PCM market is EMC, which is expected to

grow as much as 85–90% in mainframe disk revenue when compared to 1993. EMC has done a solid job of marketing its lower price-point storage alternatives to customers looking for relief from previous mainframe-storage pricing structures.

Although the European economy is as a whole showing signs of recovery, most European-based vendors are expected to experience declines in 1994 in local market currency. The positive effect of year-over-year currency conversion to U.S. dollars is expected to present a more moderate decline compared to 1993 revenue conversion rate levels.

Favorable currency conversion rates in 1994 are expected to contribute to slight increases in Japanese company converted U.S.-dollar revenue. However, in local market currency we believe these vendors' revenues will decline in the 5–10% range across the board.

## Mainframe Outlook for 1995

The mainframe market will begin to see some pricing moderation in 1995, which could contribute to a more stable rate of revenue decline through the end of the decade. Customer recognition of the viability of mainframes for specific workloads is also expected to improve the perception of large-scale systems. However, the key to the future health of the large-scale market is in meeting the challenges that mainframe vendors face long term, including the following:

- **Coexisting better with alternate technologies.** They must provide more complete integration with the growing heterogeneous platforms being installed in most organizations.
- **Demonstrating software superiority.** Although IBM's software price restructuring is fueling a renewed interest in the mainframe, we believe that IBM must be able to better communicate these advantages with real-world examples to further improve large-scale system perceptions.
- Providing at least state-of-the-art development tools. Mainframe vendors must attract new application development by improving the environment with additional tools and facilities to enhance and speed up the development and implementation process.
- **Reducing costs.** They must continue to work toward reducing the manufacturing costs for mainframe technology to be able to better compete with midrange and LAN-based alternatives. Announcements in 1995 will lead to improvements in CMOS-based processor performance. The stage will then be set for the use of CMOS as the base technology in all mainframes by the end of the decade.

However, we do not believe the large-scale market is poised for a return to sustainable revenue growth in the near term. IBM is now attempting to improve the perception of the S/390 mainframe as a potential platform for future workload requirements. The challenge remains for all large-scale system vendors to improve manufacturing cost efficiencies and attractiveness for new application development.

*— Written and researched by members of IDC's Commercial Systems Program, including Steve Josselyn.*

Volume 30, Number 3–4

# Strong Worldwide Software Growth in 1994

In 1994, overall software market growth totaled 11.2%. By segment, performance diverged, with applications surprising on the up side and tools and system-level software slightly lower than expected. Nineteen ninety-five will see a 12%+ growth in worldwide software revenues. Tools and system-level software will accelerate beyond their 1994 performance. Several more large strategic consolidations are likely in 1995, but the emphasis will be on smaller vendors to round out product portfolios.

The primary industry segments played to the major themes IDC has identified for software in the past year. Successful system software vendors have found a way to maintain revenue streams from mainframe product lines while architecting solutions for heterogeneous system management for their installed bases.

Worldwide Software Revenue: Top 20 Vendors, 1989–1994 ($M)

| Company | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1994 % Share |
|---|---|---|---|---|---|---|---|
| IBM | 8,424.0 | 9,952.0 | 10,524.0 | 1,1103.0 | 10,953.0 | 11,282.0 | 14.6 |
| Microsoft | 829.0 | 1,252.0 | 2,019.0 | 2,829.5 | 3,809.0 | 4,776.3 | 6.2 |
| Computer Associates | 1,484.0 | 1,526.0 | 1,589.0 | 1,590.0 | 1,928.6 | 2,229.4 | 2.9 |
| Oracle | 668.0 | 778.0 | 800.0 | 1,058.0 | 1,391.6 | 1,885.9 | 2.4 |
| Novell | – | 456.0 | 640.0 | 889.1 | 1,198.0 | 1,534.7 | 2.0 |
| Hewlett-Packard | 550.0 | 600.0 | 702.0 | 793.5 | 1,014.3 | 1,231.2 | 1.6 |
| Digital Equipment | 850.0 | 940.0 | 967.2 | 988.4 | 951.8 | 934.9 | 1.2 |
| Lotus | 526.0 | 550.0 | 727.0 | 817.0 | 867.7 | 860.4 | 1.1 |
| WordPerfect | 281.0 | 452.0 | 532.0 | 532.0 | 690.0 | 775.6 | 1.0 |
| Unisys | 700.0 | 800.0 | 740.0 | 712.0 | 780.0 | 760.0 | 1.0 |
| AT&T Computer Systems | 408.0 | 575.4 | 623.1 | 676.0 | 699.5 | 742.5 | 1.0 |
| Sun | 150.0 | 424.6 | 530.7 | 590.1 | 620.0 | 706.1 | 0.9 |
| SAP | – | 192.0 | 271.0 | 301.0 | 414.0 | 659.0 | 0.9 |
| Sybase | 57.0 | 89.0 | 132.5 | 219.8 | 364.5 | 595.4 | 0.8 |
| Bull | 0.0 | 684.0 | 662.0 | 598.1 | 540.0 | 513.8 | 0.7 |
| Legent | 201.5 | 282.7 | 318.6 | 433.9 | 416.5 | 489.4 | 0.6 |
| Apple | 90.0 | 290.2 | 329.4 | 370.0 | 432.6 | 479.8 | 0.6 |
| Intergraph | – | – | 440.6 | 455.0 | 486.7 | 458.1 | 0.6 |
| Autodesk | 173.0 | 238.0 | 281.7 | 367.7 | 405.6 | 458.0 | 0.6 |
| Cadence Design | – | 281.5 | 311.0 | 395.4 | 363.5 | 420.0 | 0.5 |
| *Total U.S.* | 27,233.7 | 37,335.9 | 41,841.7 | 47,309.0 | 51,967.3 | 57,964.6 | 75.1 |
| *Total Intl.* | 473.3 | 1,850.7 | 14,799.2 | 16,121.8 | 17,420.2 | 19,188.1 | 24.9 |
| **Total Worldwide** | 27,707.0 | 39,186.6 | 56,640.8 | 63,430.8 | 69,387.5 | 77,152.7 | 100.0 |
| Growth (%) | | 41.4 | 44.5 | 12.0 | 9.4 | 11.2 | |

*Source: International Data Corporation, 1995*

Tool vendors elected one of three tactics. Integrated CASE and 4GL companies scrambled either to reinvent themselves as methodology-independent component tool vendors or to offer second-generation functionality to develop larger, more complex applications. Others, led by the database companies, added downward-scalable tools to exploit workgroup and departmental opportunities.

Rapid growth in application markets has followed conversion to client/server environments, with new opportunities emerging for applications that facilitate reengineering and automation of processes hitherto thought to be too complex to computerize. The following were among the year's highlights across each sector:

- The total worldwide packaged software market turned in 11.5% growth in 1994 revenue to reach $77.2 billion across all primary software markets.
- The system-level software primary market turned in 8.2% growth in 1994, below IDC's previous forecast of 9.2% for the period.
- The application-development tool primary market turned in 12.5% growth for 1994, lower than the 13.3% previously forecast.
- The application-software primary market turned in 12.5% growth for 1994, higher than the 11.7% originally forecast.
- IBM is expected to grow in terms of absolute revenues; however, it will continue to lose share to Microsoft, Oracle, Computer Associates, Novell, and Hewlett-Packard.

Tactical consolidations accelerated in 1994, and the following were notable:

- The purchase of Digital's Rdb database by Oracle and CA's rescue of ailing Ask/Ingres, reducing the relational DBMS market to five players
- Microsoft's bid for key home applications with the megapurchase of Intuit
- Adobe's purchase of Aldus to consolidate its position in publishing
- Sybase's purchase of Powersoft in an attempt to address its lack of

Worldwide System-Level Software Revenue: Top 10 Vendors, 1989–1994

| Companies | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1994 % Share |
|---|---|---|---|---|---|---|---|
| IBM | 4,885.92 | 6,747.46 | 7,156.32 | 7,594.45 | 7,338.51 | 7,558.94 | 33.7 |
| Microsoft | 389.63 | 492.04 | 728.86 | 976.18 | 1,333.15 | 1,671.71 | 7.5 |
| Novell | – | 424.99 | 595.84 | 835.75 | 1,168.05 | 1,496.33 | 6.7 |
| Computer Associates | 648.51 | 665.34 | 692.80 | 693.24 | 869.78 | 1,005.46 | 4.5 |
| AT&T Computer Systems | 228.48 | 542.03 | 587.58 | 638.14 | 660.33 | 700.92 | 3.1 |
| Hewlett-Packard | 324.50 | 324.00 | 379.08 | 404.70 | 488.89 | 593.44 | 2.6 |
| Unisys | 560.00 | 624.00 | 569.80 | 541.12 | 577.20 | 562.40 | 2.5 |
| Legent | 185.38 | 265.74 | 298.53 | 406.56 | 400.26 | 470.31 | 2.1 |
| Sun | – | 212.30 | 334.34 | 371.76 | 380.06 | 432.84 | 1.9 |
| Bull | 0.00 | 562.25 | 544.16 | 491.64 | 443.88 | 422.34 | 1.9 |
| *Total U.S.* | 8,580.83 | 14,898.65 | 16,372.43 | 17,902.52 | 18,783.71 | 20,425.73 | 91.1 |
| *Total Intl.* | 3.00 | 681.03 | 2,057.86 | 2,082.10 | 1,946.98 | 2,002.79 | 8.9 |
| **Total Worldwide** | 8,583.83 | 15,579.68 | 18,430.29 | 19,984.62 | 20,730.69 | 22,428.52 | 100.0 |
| Growth (%) | | 81.5 | 18.3 | 8.4 | 3.7 | 8.2 | |

*Source: International Data Corporation, 1995*

modern tools and its purchase of Micro DecisionWare to gain open interoperability

- Novell's purchase of WordPerfect and Quattro Pro (from Borland) in a tactical counter to Microsoft's interoperable applications based on Ole
- Sterling's purchase of KnowledgeWare to take a position in client/server tools
- Compuware's purchase of Uniface to leverage Compuware's existing large consulting staff and access to corporate MIS
- D&B's purchase of Pilot Software to exploit information access and develop new business applications

## System-Level Software

System-level software revenue will grow by 8.2% from 1993 to 1994 to a total of $22.4 billion. This is one percentage point lower that last year's estimate of 9.2% growth. Most of the shortfall is attributable to the fact that IBM's recovery, although real at 3% year-to-year, was not as aggressive as the earlier projection of 4.5%.

The key to success for traditional system software vendors is how smoothly they can transition from their mainframe product lines in such a way that they maintain a good revenue stream while pumping resources into new products. These will consist of new applications running in and managing more diverse environments.

The open-system- and PC-LAN-oriented vendors have a different problem. They are well known at the desktop and in the small LAN installations, but frequently have no "mind share" or credibility in the central IS organization. Their success will depend on their ability to convince central IS that they understand the rigorous requirements for business-critical systems. We put Microsoft and Novell in this group, with Novell having a slight credibility edge.

### *IDC Prospective*

IDC looks for an increased growth in 1995 in system-level software revenues in the range of 8.5–9.0%, consistent with earlier published forecasts. We see an increased demand for software to manage distributed operating environments. This software is just now becoming available and usable. We foresee numerous partnerships between system-monitoring vendors and tool vendors to integrate performance monitoring and prediction with development tools for distributed applications.

## Application Development Tools

The overall application-development tool market (including object-oriented tools) is still very healthy and exhibited a 12.5% revenue growth in 1994 to $21.9 billion, up from a 10.9% growth in 1993. The RDBMS market is clearly the growth leader. The top ISV database vendors posted gains significantly higher than the overall tool market: Sybase (63%), Oracle (36%), and Informix (25%).

Nineteen ninety-four saw some consolidation of the tool market as the leading vendors gained a larger share of the overall market. Growth for the top-ten tool vendors was 17.0% compared to the 12.5% growth overall. The smaller vendors experienced lower growth than expected, resulting in an overall revenue growth 1.0% less than IDC forecasted.

Tool vendors clearly delineated themselves as they elected one of three tactics. CASE companies generally scrambled to reinvent themselves as methodology-independent component tool vendors. In the balance was whether they could ramp up lower-cost product components before the market for monolithic and consulting-heavy sales opportunities at large shops dried up. The trick is to define the toolset so that it is scalable across application challenges and levels of user expertise or risk defection of one's base and confusion of one's message.

In this race Intersolv and TI suffered, but pulled it off. KnowledgeWare choked on a surfeit of acquisitions it couldn't integrate

and was acquired by Sterling Software as its entry in client/server tools. Bachman and CGI will hang in the balance in 1995. The component tactic may not net these vendors much. Now they are required to explain their advantages over rearchitected programmer development environments offered by Microfocus, Symantec, Computer Associates, and HP.

On another tack, many of the CASE and 4GL vendors like Cognos, Unify, Oracle, Sapiens, Seer, and Informix released second-generation functionality while conceding mind share to Powersoft for initial information-access applications.

Others, led by IBM, Oracle, and Sybase, added downward scalable databases and tools to exploit workgroup and departmental opportunities. IDC demand-side data shows that small-to-medium sites account for as much as 40% of the spending potential for these low-end tools. The fact that this opportunity is one hundred times more widely dispersed than traditional sales points means that success will depend on the cost-effective use of indirect channels.

Client/server is a hot market; nevertheless, much of the activity in 1994 revolved around the low-end information-access tools, resulting in a decline in effective unit prices and changed license models for conventional vendors, all of which now offer licenses based on concurrent users. The new models allow companies to gear up for client/server at a lower initial cost, a fact that will depress revenues initially but, we believe, encourage more adoption in the long term.

### *IDC Prospective*

IDC believes that the application-development tool market will continue to be strong in 1995 and turn in a 13%+ revenue growth. The market drivers will be continued strength of RDBMS, the maturing of client/server tools, and 4GLs. New object-oriented tools are on the horizon, especially for client/server, and they offer solid potential as the absolute size of these fast-growing markets becomes large enough to impact the aggregate averages.

We expect several niche markets to emerge and grow rapidly in the next year, possibly supplying targets for acquisitions. Among these are data warehousing, testing tools, configuration management, and portable GUI builders.

## Applications and Information Access

The 1994 application-solution market grew as IDC expected. During the first half of 1994, IDC forecasted it to grow 11.7%. Now, based on three quarters of preliminary results, IDC is adjusting its forecast upward less than 1.0% to 12.5%.

Much of the growth in 1994 was driven by client/server applications. These will account for only 18% of application revenues worldwide in 1994. However, IDC expects revenue growth in this software segment to be 69% in 1994 relative to 1993, compared to 4% for non-client/server.

Client/server computing and advances in networking are resulting in new applications. Emerging application categories include workgroup computing, workflow automation, and supply-chain automation. Also, as vendors and users migrate legacy production code to client/server environments, new associated applications emerge. Client/server accounting software vendors offering general ledger, accounts payable, or fixed assets, for example, increasingly compete on value-added functions such as budget-process automation, reporting, and workflow.

The spread of networking is leading to cross-department automation. As a result, departments that have been traditionally underautomated — such as customer service, sales, and marketing — are being considered for reengineering efforts. No one of these areas alone represents a sizable packaged software market because the cost justification for companies lies in the ability to share information across departments. This ability is still lacking in most of today's packaged solutions. IDC expects that sales, marketing, and service functions will become important applications in the near future, however, defining a company's "customer care" strategy. IDC expects growth across these and related applications.

### *IDC Prospective*

We expect an acceleration in the application market as client/server penetrates a larger fraction of the total offerings, yielding a revenue growth of 13%. The application market is experiencing a paradigm shift from cross-industry to vertical applications brought on, in large part, by new applications resulting from reengineering projects. We foresee an increased interest in vertical market programs, as well as mergers and consolidations for industry coverage. We see an increase in the use of object technologies among application vendors as a strategy for extending the reach of existing applications into related industries.

## Overall Software Market Conclusions

The outlook for 1995 is better than 1994. With a recovering Europe and some of the uncertainty lifting from client/server architectures as a result of several years' experimentation, we look for a growth in the 12%+ range. Software spending will be strategic — solid and steady, but not runaway. We look for continued consolidation at a reduced pace. None of the vendors is so large that size has ceased to confer a comparative advantage from economies of scale, except when large organizations' inertia and overheads squander such efficiencies.

*— Written and researched by members of IDC's Software Research Group, including Clare Gillan, Richard V. Heiman, R. Paul Mason, and Anthony C. Picardi.*

# AOE Servers and Hosts

Unix-based AOE server suppliers exploited their opportunity to prove the strength of Unix-based applications and database servers, positioning their overall stability and scalability — as well as their rich development and management environments — against NetWare and NT servers. However, that message is weakening vs. NT, though NetWare is still really only strong in file- and print-sharing functions.

With the momentum of "turnkey" Unix/RISC or Unix/Intel server offerings and the growing momentum of NT Server, we believe 1995 will be the defining year for the newer shrink-wrapped Intel Unixes. SCO's position in small-business host systems and its growing strength in branch automation appear assured. But without major efforts in demand generation, channel development, expanded device support, and partnerships with major Intel hardware suppliers, the future of UnixWare or Solaris/Intel is uncertain.

The packaging and API emphasis launched in 1994 will expand in 1995 and beyond. Specifically, opportunities exist for Unix or NetWare resellers to create BackOffice-like packages for small to medium-sized workgroups. Companies that collect client/server foundation technologies (advanced OS, database, man-

Worldwide Shipments of Selected AOE Server/Host Systems, 1993 and 1994

| | 1993 | % Growth | 1994 |
|---|---|---|---|
| Windows NT | 29,000 | 175.9 | 80,000 |
| OS/2 | 110,000 | 0.0 | 110,000 |
| NetWare 3.x and 4.x | 440,000 | 31.8 | 580,000 |
| Solaris | 21,000 | 123.8 | 47,000 |
| SCO | 157,000 | 10.8 | 174,000 |
| HP-UX | 24,000 | 58.3 | 38,000 |
| AIX | 39,000 | 17.9 | 46,000 |
| UnixWare | 11,000 | 127.3 | 25,000 |
| NeXTstep | 1,000 | 100.0 | 2,000 |
| Other Unix | 170,000 | 6.5 | 181,000 |
| Total Unix | 423,000 | 21.3 | 513,000 |

*Source: International Data Corporation, 1995*

agement and directory services, development environment, messaging) into easy-to-purchase-and-use packages or modules will be the best positioned.

Likewise, creating, documenting, promoting, and offering tools to support APIs surrounding the foundations and other technologies and /or markets is a winning strategy for AOE suppliers and their partners. Opportunities exist in objects, vertical market customization, and heterogeneous system integration. Microsoft's key weakness (or add-on opportunity) is in directory services. Its management story is also largely oriented toward distribution of applications and desktop asset management, rather than heterogeneous system and network management.

## AOE Desktops

Demand generation for commercial AOE desktops continues to be a critical question mark. Suppliers still cannot articulate to users and ISVs the advantages of AOE clients — specifically, flexibility in development and deployment of customized distributed applications, and potentially better management. Low-technology client/server adoption (e.g., Windows to NetWare, or, at best, through NetWare to Unix databases) predominates.

As we said last year, Microsoft's repositioning of NT and Windows 95 dilutes the effectiveness of NT as a desktop AOE, but strengthens Windows 95 as a volume, "middleweight" client. Although we expect Windows NT to be the fastest-growing workstation-class environment, mainstream Unix workstation suppliers last year did better than we had forecast.

IBM wisely redefined its workplace strategy to deemphasize a multipersonality, Mach-based OS, instead using the term as a catch-all for a collection of future technologies capable of running on multiple AOEs. Its delay of PowerPC-based low-end desktops due to lack of a differentiating operating system (OS/2 late, no MacOS license, fear of NT) was another correct decision, but a momentum-stalling one.

Someday IBM may see the light — just as Microsoft did — and refocus OS/2 positioning as a server AOE. OS/2 server momentum from LAN Manager is history, and its Lotus Notes franchise may be at risk. With Notes ported to major Unixes and to Windows NT servers, its scalability and management will be strengthened. Sun and HP already bundle Notes with some servers; even more tightly integrated packages will follow. IBM could, in fact, continue some OS/2-server momentum with Notes-in-a-box, DB2-in-a-box, or Internet-server-in-a-box (like its slickly packaged Warp desktop) easy-to-install-and-manage offerings.

## 1994 Recap

As noted, major NT and OS/2 repositioning were key market activities in 1994. Likewise, SunSoft totally shifted its emphasis for its slow-developing Intel Solaris product from the desktop to the server.

In packaging, BackOffice, Sun Microsystems' Netras, and Notes integration by several players, including SCO, were industry-leading examples. Compaq's strategy in packaging management middleware on NetWare and other AOEs was mimicked by IBM and HP and nearly every other Intel server company.

While we admired Microsoft's elegantly simple BackOffice pricing model (especially since it is hard to duplicate by server-, rather than client-oriented competitors), IDC and others pointed out its inherent disadvantages in database configurations. Sybase and Novell's immediate response, and Microsoft's instantaneous backpedaling, exposed one of Microsoft's rare marketing weaknesses. Even Microsoft cannot always impose its own unique — and unfamiliar — desktop-centric visions on multiuser-competitive environments.

Novell countered some of the NetWare 4.x problems with an easy-to-install 4.01 release that allowed less sophisticated users to preserve their current directory/bindery approach and take an incremental step toward 4.1's promise. Still, the 4.x ramp was quite slow. And, under new management, Novell essentially abandoned some of its grander unifying API

strategies with the deemphasis of AppWare, refocusing its architectural franchise efforts more modestly on directory and perhaps management services. But we have a net positive assessment of Novell's recent tactical moves — clearly determining which businesses it is in and which it is not — and see interesting promise in the WordPerfect acquisition.

The leading Unix midrange players — HP, IBM, AT&T, Sun — had excellent volume and revenue growth. Furthermore, AT&T added to its Unix success by being the single most aggressive, and successful, direct-sales player with Windows NT (Compaq is the other NT server leader). AT&T picked up the ball dropped by Digital and Sequent and was early to push NT as a business-critical server, particularly in branch automation. Perhaps surprisingly, large customers rolled out more than a handful of SQL Server/NT applications in 1994, proving an indicator of NT's potential in 1996.

After 1993's rollout, heavily biased toward developers and tire kickers, Windows NT Workstation shipments actually declined slightly in 1994. But the buyers in '94 were generally actually using the product and represent a shipment total that would look good in the traditional workstation market.

## AOE Near-Term Outlook

AIX 4.1 still needs a good year of SMP tuning and lacks some of the features of its previous edition: specifically, HACMP fail-over capability should become available in mid-95. Contrary to some harebrained press reports, AIX is not dead. Far from it, it is a strategic IBM AOE that is more likely than OS/2 to contribute significant hardware revenues and API technology momentum.

Sun Microsystems is right where we forecast in its migration from Solaris 1 (Berkeley-based SunOS) to Solaris 2. While its servers have been shipping primarily with Solaris 2 since day one, we estimate that its workstation customers only recently crossed over the halfway point. Solaris 2.4 is solid, scalable, feature-rich, and synchronized between Intel and Sparc. It is clearly the SunSoft platform ISV's should target, especially with applications and middleware oriented toward true distributed computing.

Worldwide Shipments of Selected AOE Desktop/Client Systems, 1993 and 1994

| | 1993 | % Growth | 1994 |
|---|---|---|---|
| Windows NT | 215,000 | -2.3 | 210,000 |
| OS/2 | 1,890,000 | 20.4 | 2,275,000 |
| NetWare 3.x & 4.x | – | | – |
| Solaris | 249,000 | 11.6 | 278,000 |
| SCO | 32,000 | 9.4 | 35,000 |
| HP-UX | 120,000 | 24.2 | 149,000 |
| AIX | 39,000 | 10.3 | 43,000 |
| UnixWare | 24,000 | 4.2 | 25,000 |
| NeXTstep | 24,000 | 37.5 | 33,000 |
| Other Unix | 155,000 | 17.4 | 182,000 |
| Total Unix | 643,000 | 15.9 | 745,000 |

*Source: International Data Corporation, 1995*

The following are some of IDC's expectations on important AOE futures:

- Cairo is a mirage on the horizon. Microsoft will likely add the Explorer user interface to Windows NT before the next major NT release, but probably not until 1Q96. We would be surprised to see a major new release or the object-oriented file system before late 1996 or into 1997. Microsoft's Exchange Server groupware/messaging product may debut midyear 1995, but its feature set will lag Lotus Notes significantly.
- NetWare 4.1 is due to ship. We are expecting the new, more flexible licensing policies to increase its acceptance at smaller companies and sites. NetWare's early-phase multiprocessing support was partially dependent on the largely deemphasized Processor-Independent NetWare and may be delayed to the second half. SuperNOS is a concept, not a product, until late 1996 at the earliest.

- UnixWare 2.0 is late, but should be announced in 1Q95. It will feature support for threads and SMP and include improved NetWare integration features.
- HP-UX 10.0 continued to slip through 1994, and we now expect its arrival in January along with a major HP hardware release. Expected features include the synchronization of workstation and server lines, a journaling file system from Veritas, and enhanced SMP support.
- SCO may release its next major product, code-named Everest, in mid- to late 1995. It will probably take its usual pragmatic approach and release enhanced remote and centralized management features before that time.
- IBM is targeting 1Q95 for the client edition of OS/2 Warp with the necessary networking protocol support as a bonus pack.

## 1995 Shipment Expectations

NT server sales, especially in conjunction with SQL Server and BackOffice, should more than double in 1995. Client dragalong, development seats, and moderate traditional "workstation" application penetration should produce 80–85% growth for NT Workstation shipments.

NetWare 3.x continues its strong growth, but in relatively low-function environments. We expect the slow ramp of 4.x to continue, though 4.1 and Novell's growing experience will pick up the pace. Overall, NetWare should grow in the 18–20% range.

Warp is a shot in the arm for OS/2, but not in the real AOE competitive environment. OS/2's impact is still largely confined to the mainstream desktop market, where comparisons to Windows '95 and MacOS are more valid, and more damning. IBM needs to identify and productize some niches it can really play a role in (e.g., advanced client/server applications, customer support, development seats, insurance and finance markets) and spread its volumes and APIs there. OS/2 should see only 5–10% server shipment growth, but solid desktop growth, in the 50–55% range.

True Unix midrange systems did better than we expected last year, and shrinkwrapped Unix multiuser systems did worse. We believe many conservative customers are still unwilling to deploy large numbers of systems exploiting this instance of IT industry "dis-integration." Thus, we foresee continued strength for the "turnkey" approaches of the big four players.

We expect nonshrinkwrapped Unix server shipments to moderate somewhat from their 40% pace in 1994 to 30–35% in 1996. Shrinkwrapped Unix multiuser systems should increase somewhat, to 20–25% growth. On the single-user side, we expect workstation growth in the 17–18% range, and Unix PCs to slightly outpace that at 20–22%.

*— Written and researched by members of IDC's Unix and AOE group, including David Card.*

Volume 30, Number 3–4

# Winchester Disk Drive Industry in 1994: An Up Cycle with Resilience

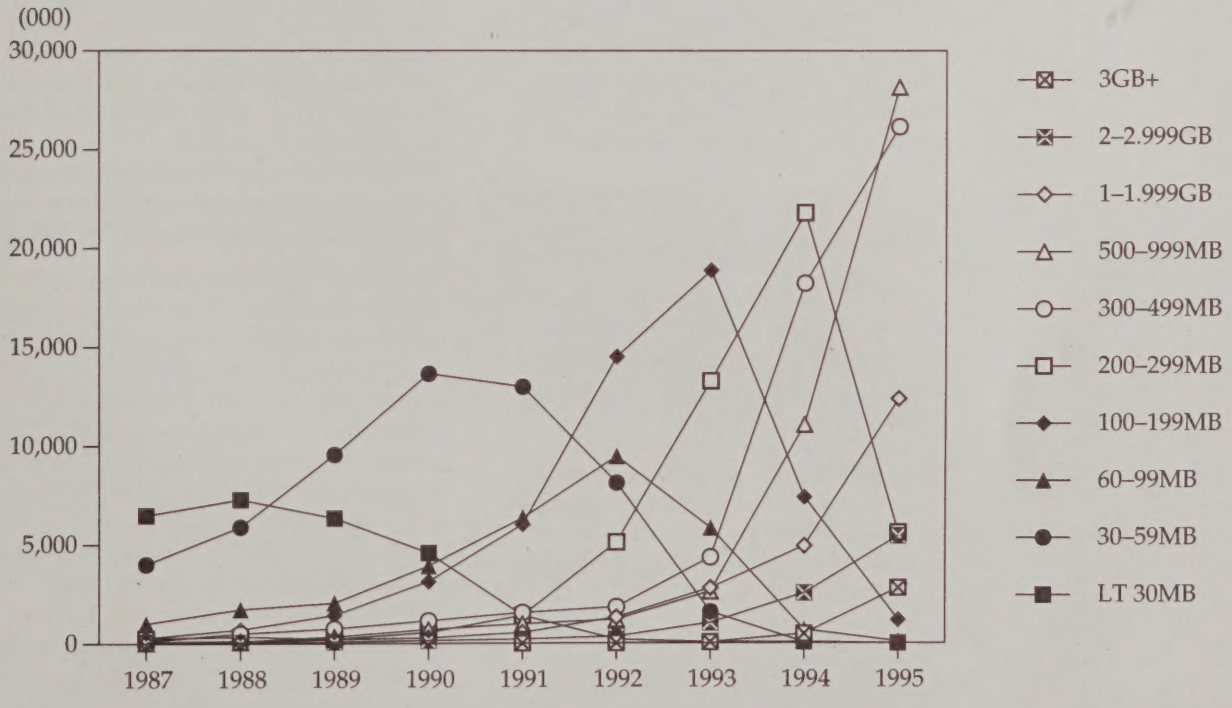
The Winchester disk drive industry had a strong 1994, posting unit and revenue growth of 33% and 23%, respectively. Although allocation conditions existed in the first half of the year, competition was intense, centering on mainstream 3.5"capacity points. Successful suppliers (1) executed on an early time-to-volume strategy in the most price-aggressive markets, (2) solidified customer relationships with strategic OEMs, and (3) took advantage of a full-line supplier model where possible to avoid uneconomic business.

Our expectations of strong end-market demand in 1995 must be considered in the context of supplier desire to grow or retain market share through ramping production. We are encouraged by the recent level of responsibility achieved by drive-company management, particularly with respect to balancing the need to grow in the context of total industry demand.

## Industry Highlights

Based on multiple measures in 1994, the HDD industry improved on 1993's performance. Not the least of the positive trends was the consistency that prevailed in sequential quarter comparisons; only the summer quarter experienced softness in response to the normal flow of business in Europe. We offer the following industry-specific observations:

Worldwide Shipments of 8"+, 5.25", 3.5", 2.5" and 1.x" Winchester Disk Drives, 1987–1995 (E)




*Source: International Data Corporation, 1995*

- Demand held firm throughout the year fueled by a consumer-driven PC market.
- At 67.2 million, HDD unit growth was 33%, an acceleration from last year's 20%.
- At $16.9 billion, HDD revenue growth was 23%. The combination of strong unit shipments and a moderation in price declines relative to a year ago fueled the double-digit growth.
- Nineteen ninety-four gave us the first glimpse of moderating industry cyclicity; as we approached the tenuous summer months, HDD suppliers generally held inventories in balance with demand and with upcoming product transitions.
- The industry is entering 1995 with inventories under control and ready to leverage our expectations of healthy growth in computer systems (fueled largely by PCs).

We noted little change in form-factor rankings in 1994, with 3.5" still accounting for 86% of the total market and posting the most substantial year-to-year growth; however, end users' insatiable appetite for megabytes and better definition with respect to mobile market requirements meant for a faster-than-expected transition to higher capacities; specifically:

- Mainstream 3.5" desktop capacities moved from 170MB in CY1Q to 250MB in CY2Q to 420MB as we exit CY4Q.
- Availability of 9GB 5.25" HDDs (largely from SGAT) caused 5.25" revenues to grow again beginning mid-year.
- Notebook PC priorities centered around highest-available capacity in a 2.5" 19mm package, allowing this market to yield a payback for a few suppliers.
- We continue to scale back our expectations for 1.8". As was the case in the early stages of 2.5", however, there is a viable business for a small number of suppliers (three at the most).

HDD suppliers entered 1994 on allocation, aggressively ramping capacity to fill the void remaining in the wake of a strong CY4Q93. Responding to such periods of undersupply has become easier with yields and utilization rather than physical additions to plant able to accommodate much of the tactical growth in demand. For 1994 overall, IBM, Quantum, and Western Digital represented the bulk of the increase in square footage. In these cases new facilities were located in more cost-effective geographies to achieve cost savings as well.

For the year, we expect total HDD unit shipments of 67.2 million. This represents a 33% increase year-to-year and is 10% above the expectations set in our May 1994 Databook. The stronger-than-expected performance is explainable by a surge in demand for desktop PC-class 3.5" products. Not only did PC suppliers effectively deliver value at an attractive price point, but HDD suppliers responded in force with low-cost HDDs at mainstream capacity points.

Desktop capacity migration during the year was particularly pronounced. In our view, an important catalyst for this transition was the focus on cost. No, the $100 disk drive is not yet feasible at an acceptable capacity; however, in 1994 PC OEMs exhibited a decided priority on cost and a reluctance to pay up for performance. This meant that products such as Conner's Bobcat and Quantum's Maverick experienced strong demand both on entry-level and value-based PC systems.

The year brought better definition and additive business opportunities for a number of higher-end suppliers. Over the last 12 months, notebook manufacturers have been in volume production of full-function portables with storage requirements closely matching desktops. IBM and Toshiba, in particular, experienced strong sales for "high-capacity" 2.5" products available at or ahead of the technology curve (i.e., 500MB+). The 1.8" opportunity has also been solidified, albeit in very small volumes, based on small notebooks, pen-based systems, and application-specific aftermarket opportunities.

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## Pricing Didn't Feel As Bad

For the first two quarters of 1994 suppliers reported sequential quarter price declines in the 5–8% range, which was "reasonable" in the context of planned product cost reductions. On a product-by-product basis, however, actual declines were more substantial, particularly as a capacity point came into volume in the PC mainstream. For example, 340MB and 420MB HDD prices fell 30% and 49%, respectively, for the year as a whole.

As supply and demand came into better balance by mid-year, the pace of overall declines accelerated modestly to the 10% range. Any acceleration from here will be tempered near term by the seasonally strong CY4Q demand.

The combination of more "normal" pricing in aggregate, and strong unit shipments boosted revenue performance for the year. We are targeting $16.9 billion, up 23%. Certainly an improvement over 1993's dismal 4% increase.

## Company Assessments

There were no casualties over the last 12 months, but some clear winners emerged. Failure to execute with respect to product plan and customer expectations remains a supplier's greatest liability. Rebuilding credibility is arduous, costly, and risky. We are encouraged by the recent attention to product and execution strategies at Conner, Maxtor, and Micropolis.

Among the industry leaders, Quantum scored a two-point improvement (not including the Avastor acquisition) in unit market share and remains the volume leader. Western Digital easily displaced Maxtor in the number four spot given the latter company's lack of attention to its desktop product line over much of the year. Of the 16.8 million year-to-year increase in units, 73% is attributable to Quantum, IBM, and Western Digital.

## HDD Suppliers Are Big Companies

In 1994 HDD suppliers became "big" companies. Seagate is now running at a $1 billion per-quarter revenue run rate; the acquisition of Digital's storage business vaults Quantum into a comparable ranking. In each case, with size comes product-line breadth and increased vertical integration, or what IDC describes as a "full-line supplier" model. Both are valuable assets in a cyclical business if combined with solid execution and a state-of-the-art, manufacturable technology; specifically, Seagate was able to outperform its competitors throughout much of 1994 by leveraging this model; specifically, using high-end market success and above-average profitability to offset a tougher competitive environment on the desktop and a misstep in 2.5".

Worldwide Winchester Disk Drive Market Share, Captive and Noncaptive Shipments (E) 1993 and 1994

| Manufacturer | 1993 (%) | 1994 (%) |
|---|---|---|
| Quantum | 21 | 23 |
| Seagate | 20 | 19 |
| Conner Peripherals | 19 | 16 |
| Western Digital | 10 | 13 |
| IBM | 8 | 12 |
| Maxtor | 10 | 6 |
| Toshiba | 3 | 3 |
| Avastor* | 1 | 2 |
| Samsung | 1 | 2 |
| Fujitsu | 2 | 1 |
| Hewlett-Packard | 1 | 1 |
| Micropolis | 1 | 1 |
| Others | 3 | 1 |
| Total | 100 | 100 |

*Purchased by Quantum in June 1994. IDC will consolidate Avastor into Quantum beginning January 1, 1995.

*Source: International Data Corporation, 1995*

## 1995: What to Watch

We have increased our 1995 forecast to 81.8 million units representing a year-to-year increase of 22%. Underpinning this outlook is our belief that the combination of low-cost megabytes, a new operating system, and two new processors will continue to drive both new PC sales and aftermarket activity.

Challenges in 1995 will come in the form of manufacturing capacity, product execution, pricing trends, and technology adoption. We note the following:

- The market will need to absorb further incremental capacity. IBM and Western Digital are both prepared to again add to physical plant, and others will be focused on "growing into" existing infrastructures.
- Virtually all HDD suppliers will transition multiple mainstream 3.5" and 2.5" product lines over the next six months; specifically, the 3.5" mainstream will move to single-platter 420MB and 540MB designs by mid-year (yielding a cost-effective solution at 1GB, as well). The 2.5" success will be found above 500MB in 12.5mm-high packages. The window is short for recently announced 340MB- and 420MB-capacity products.
- The recent price stability is temporary. Computer systems customers and drive suppliers now have experience using price as a lever to catalyze business or as a defensive tool to compensate for poor execution.
- Technology remains important to achieving product differentiation and customer commitment. IBM is taking this approach through its aggressive MR head implementation with significant success. Competitors are responding through (1) internal investments in captive component supply or (2) sustaining "virtual company models" that imply close, mutually supportive relationships with core suppliers.

*— Written and researched by members of IDC's Storage Program, including Alexa McCloughan and Crawford Del Prete.*

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# Video-on-Demand Trials: IT Suppliers Face Technical, Marketing, and Regulatory Hurdles

Video-on-demand (VoD) has the potential to drive a new phase of growth for IT suppliers. Market opportunities are emerging for server makers (video servers), transport providers and managers (broadband digital service), and personal "terminal" suppliers (set-top, PC-based, etc.), among others. To position themselves for the nascent opportunity, groups of companies have joined together to develop trial VoD systems and roll out pilot VoD programs. Their goal: negotiate serious technical hurdles while addressing market requirements of low cost and ease of use. This issue of *The Gray Sheet* highlights several key alliances targeting the VoD market and examines trials coming out of these complex collaborations.

The creation of a new market, like any great endeavor, requires that companies work together. Video-on-demand requires a broad array of expertise: video server equipment, ATM networking, high-speed switching, compression and decompression, encoding and decoding, authoring systems, etc. Thus, to deliver turnkey multimedia systems, Regional Bell Operating Companies, independent long-distance and local carriers, cable television companies, video programming providers, and a host of telecommunications and computer equipment manufacturers will need to work together.

By comparison, the original PC was fairly simple to put together, requiring (at its inception) only three collaborators. The video-on-demand market requires much more. As the IT market matures, the nature of coalition building and the introduction of new architectures is becoming increasingly complex — more collaborators mean more potential for conflicts.

Of perhaps even greater interest is that many of the collaborators lay no claim to expertise in mass-market consumer products. As Intel has recently discovered, the marketing of technology products to consumers can bear little or no relation to marketing them to a business or technical audience. Given these factors, the market success of the early VoD products may be determined as much by the character of these collaborations as by the quality of the products that result.

February 10, 1995 Vol. 30, No. 5

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## A Tangled Web

Rather than put all their eggs in one basket, several suppliers (such as AT&T and Sun) have chosen to align with multiple coalitions. This may not be foolish, as long as such a strategy does not dilute the multiple efforts. The reality is that these alliances, and to an even larger extent any trials, are test balloons; serious deployment is likely a year or two away — at least.

Each faces not only significant technical hurdles, but cost and price concerns. Existing prototypes are expensive and haven't been tested under real-life circumstances. Consumers may not be willing to pay a premium for these services, so solutions will have to be inexpensive. As a result of this chaos, while technical challenges are being met existing alliances will likely dissolve and shift while new ones are formed.

VoD alliances span the entire length of the value chain from content creation, through delivery channels, to the manufacturing of consumer devices. Among the key collaborations so far are these:

- AT&T Network Systems and Broadband Technologies
- AT&T and Silicon Graphics
- Sun Microsystems and Thomson Consumer Electronics
- Siemens, Scientific-Atlanta, and Sun Microsystems
- IBM and ICTV
- Cablevision Systems and AT&T
- Bell Atlantic, NYNEX, and Pacific Telesis
- Ameritech, BellSouth, Southwestern Bell, and Walt Disney

## AT&T Network Systems and BroadBand Technologies

These two companies have come together to develop and market a switched digital video system that marries AT&T's SLC 2000 access system and BBT's FLX fiber-loop access system. The combined product, which has been named simply the SLC 2000 with the SDV feature, will enable telephone companies and cable TV providers to provide homes and offices with narrowband telephony and fully interactive broadband video and multimedia services.

The system is designed to deliver broadband services at a cost that is competitive with industry benchmarks of $1,000 per line. The system places the television tuner in the network rather than in the TV. This design enables a host of interactive services, as well as allowing service providers to interact one-on-one with a customer to keep track of what is going on in the network, such as who is watching which channel.

The system is appealing for carriers in that it can be used with a variety of drop options, including twisted pair, coaxial cable, or fiber. AT&T and BBT are using carrierless amplitude and phase modulation in the system; these will enable them to deliver 52Mbps capacity via twisted pair into homes.

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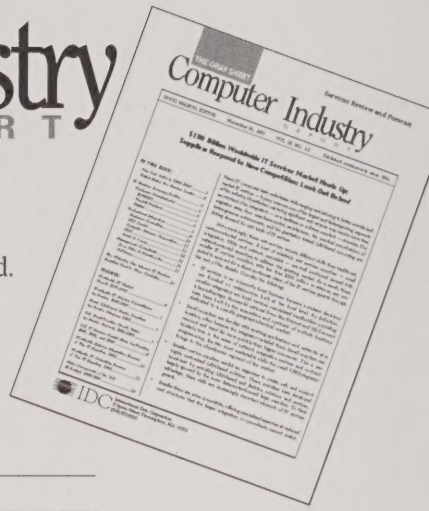


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## Alliances Formed to Provide Interactive Multimedia Services

| Alliance | Product Offering | Corporate Contributions |
|---|---|---|
| AT&T Network Systems/ BroadBand Technologies | SLC 2000/FLX switched digital video system | AT&T — SLC 2000; BBT — FLX Fiber Loop Access System |
| AT&T Network Systems/ Silicon Graphics Inc. (Interactive Digital Solutions) | Integrated video server solutions | AT&T — Network technology; SGI — Challenge server hardware and software; Models M, L, XL |
| Sun Microsystems/ Thomson Electronics | Video server & set-top box technology to support VOD & multimedia services | Sun — Multimedia Sparcserver, ATM networking, system management; TCE — Compression technologies, digital decoders |
| Siemens/Scientific-Atlanta/ Sun Microsystems | IMMXpress — multimedia network architecture | Siemens — System integrator, IN call control, ATM technology; Scientific-Atlanta — set-top terminals, hybrid fiber coax distribution; Sun — Video networking, video servers |
| IBM/ICTV | VOD hardware and software, interactive multimedia services | IBM — Network communication equipment, video servers, RISC System/6000 computers, Netview; ICTV — Head-end interactive hardware & software |
| Digital/General Instruments | Network products to support interactive video market | Digital — VIIA-Alpha AXP processors, StorageWorks disk-storage arrays, digital linear tape library systems; GI — DigiCipher II MPEG encryption system, DigiCable Set-top terminals |
| Cablevision Systems Inc./AT&T Network Systems | VOD & enhanced pay-per-view | AT&T — Complete end-to-end digital video solution — Globeview-2000 broadband system, IDS video server software, AT&T digital video home terminal, etc.; Cablevision— Cable network & fiber-optics installation |
| Bell Atlantic/Nynex/ Pacific Telesis/relationship with Creative Artists Company | Home entertainment & interactive services | Created — A media company to develop portfolio of services; Technology & Integration Co. to provide VOD systems |
| Ameritech/BellSouth Corp./ Southwestern Bell Corp./ Walt Disney | VOD & interactive video programming | Venture to develop interactive programming & navigator for easy access to services |

*Source: LINK Resources Corporation, 1994*

## Bell Atlantic Video Services, AT&T, BroadBand Technologies, General Instruments, Westell, IBM, Philips, Divicom

Bell Atlantic, which is also an AT&T/BBS customer, is running a trial in conjunction with AT&T, BroadBand Technologies, General Instruments, Westell, IBM, Philips, and Divicom. Bell Atlantic Video Services Co. (BVS) is playing a key role in bringing to market "third-generation" commercial TV, or interactive multimedia television (IMTV). The third generation moves beyond the broadcast and cable models for the television industry by adding digital interactive capabilities.

The first phase of the BVS effort began with a technical trial of ADSL technology involving 300 of its own employees in Arlington, Virginia. The technology test is evaluating the performance of MPEG encoding and decoding, video file-server hardware and software, ADSL video transport over copper wires, and new video switching techniques. The FCC recently granted Bell Atlantic permission to extend its technical trial for six months. The extension will enable the telephone company to keep the system up and running while awaiting FCC approval on its 214 request to do a video market trial in that region. The trial was set to expire September 25, 1994, but the extension will enable it to run through March 25.

The FCC granted the extension to allow more time to gather data on ADSL technology, noting that the Virginia trial is the only ADSL one currently being held in the United States. The company has

tapped Westell to provide its FlexCap product for the ADSL trial. AT&T is the prime contractor for the construction of the Bell Atlantic broadband network. General Instruments and BroadBand Technologies will also help build BAnet. This construction program is part of Bell Atlantic's $11 billion capital program for the next five years.

In the next stage, BVS plans to run a market test in northern Virginia with its Stargazer programming-on-demand service beginning in the first quarter of 1995. The company plans to use ADSL as an interim technology in video market trials in northern Virginia and also in areas of Maryland and Washington, D.C. The test will use intelligent TV set tops from three terminal vendors. The set tops would be priced at $300 if sold. Philips Digital Videocommunications and Compression Labs, IBM, and DiviCom/Adaptive MicroWare/Eurodec are involved in set-top development. Oracle software, systems, and services will provide the backbone for the Stargazer platform. Bell Atlantic and Oracle have expanded their alliance whereby the two will jointly market multimedia products and services, including Oracle's video-server software.

Stargazer is a navigational interface enabling viewers to make a program choice by moving through various categories. Bell Atlantic's Digital Production Center in Reston, Virginia is involved in supporting Stargazer programming. The full product set that BVS will offer to consumers will comprise two elements: "best of cable" (programming by appointment) followed by "best of video rental" (programming on demand), when the interactive product is fully market ready. BVS plans to offer the best of cable TV in up to six mid-Atlantic markets beginning as early as mid-1995.

Best of cable involves little new product development. The deployment issues revolve primarily around the mechanics of building earth stations and awaiting construction of the video dial-tone FSN network by the Bell Atlantic telephone companies.

Interactive home shopping will become part of the Stargazer service, and retailers — including Lands' End, Nordstrom, and JC Penney — have already agreed to participate in the market trial. Initially, customers will place their orders by dialing an 800 number that connects to the retailer's center. In 1995, online ordering will be phased in and tested with each shopping application. Interactive shopping should be ready for commercial deployment by 1996 and will be part of the service offerings Bell Atlantic intends to offer to nearly 8.5 million consumers by the end of the decade.

Bell Atlantic has also completed a test of compact-disc, interactive-based, electronic yellow-pages listings with 300 customers in northern Virginia last year and tested MicroMall catalog kiosks in Chicago. The RBOC is working on plans to take its CD-I product into a networked interactive environment in 1995.

## Bell Atlantic's Interactive Video Distance Learning Network

In October of 1994, the state of Maryland selected Bell Atlantic and AT&T to provide state schools with an interactive video distance learning network. The contract calls for Bell Atlantic to provide its distance ,learning service, tariffed since mid-1993, to nearly 230 schools and 40 public institutions at a discount for the first three years of use. The service provides two-way, full-motion video from one site to up to three other sites, all of which can interact simultaneously.

Initially, institutions will pay a monthly fee of $1,365 for local service and $2,370 thereafter. AT&T will provide schools with long-distance connectivity for a flat fee of $2,050 per month for five years.

Schools covered by the contract include high schools, community colleges, and four-year public colleges. If all the schools order service, the Bell Atlantic contract will be worth approximately $28 million. It would take three years to equip each school with fiber and classroom equipment.

Bell Atlantic announced plans earlier this year to provide these schools with one distance-learning classroom per site free of charge. Each classroom will be linked to Bell Atlantic's OC-3 fiber-optic network via three DS-3 fiber links connected to a Northern Telecom codec. Premises equip-

ment and fiber links will cost Bell Atlantic approximately $50,000 per classroom.

Pacific Bell and Southern New England Telephone have also chosen AT&T as their broadband network systems integrator. However, both telephone companies are deploying hybrid fiber/coax networks and will be using AT&T's HFC 2000 product, which consists of a network interface unit that mounts on a customer's home or at curbside, a fiber node, and a different type of HDT.

## AT&T/Silicon Graphics

In June 1994, AT&T and Silicon Graphics formed a joint venture, Interactive Digital Solutions, to rapidly develop and deploy large-scale, fully integrated, video-server solutions for telephone company networks and cable TV systems.

The new company will blend AT&T's networking technology with SGI's Challenge server hardware and software. Resulting systems will deliver video, voice, and transactional data to homes over asynchronous transfer mode (ATM) telephone and cable networks. IDS will begin its life as a seller of SGI hardware and will gradually migrate its software to run on several types of mainframes and minicomputers.

Products will be sold and serviced by AT&T Network Systems through existing sales channels with the full support of the joint venture. The new company will also provide video solutions for use in the private networks.

Strange as it sounds, IDS is late to the interactive video server game. On the software-only side, Oracle has consumed a large share of the regional telephone company video services market, and Microsoft has made inroads into the cable industry. Hardware players, including Hewlett-Packard and Digital, have been aggressively marketing their wares, and Sun Microsystems is taking off with its own software/hardware combination.

IDS may be able to differentiate itself by playing on the value of SGI's high-end computer reputation and AT&T's heritage as one of the most accomplished networking companies in the world, especially if it can get its software to run on a variety of computer platforms.

IDS video server software will be used in the commercial deployment of video-on-demand services for Cablevision subscribers beginning in mid-1995. This is the first commercial offering developed by this joint venture and will be used in conjunction with AT&T's Globeview 2000 Broadband System. AT&T and SGI engineers are just starting to work together, but considering the pace of the marketplace and the demand for these products, the companies have already quickly initiated product integration efforts.

## Time Warner Cable's Full-Service Network

The Full-Service Network (FSN) is an interactive-digital multimedia network designed to provide customers access to a wide range of entertainment, education, information, and communication services for homes and businesses.

The network is now being tested in the homes of company engineers. The initial target of 4,000 customers is still planned, but will probably reach this level only in mid-1995. The network is made possible through a strategic partnership called Time Warner Entertainment Co. The partners include Time Warner Inc., US West, Toshiba, and Itochu. One billion dollars of US West's $2.5 billion investment in Time Warner Entertainment is being directed toward the FSN rollout.

Numerous software and hardware companies have joined together to create this network.

The FSN is implementing a cost-effective fiber to the feeder architecture, which is fiber-optic cable from the head end to the neighborhood node. Existing coaxial cable is used from the node to the customer's home.

The customer can access the FSN through a prototype navigation system developed by SGI, which displays venues of services in an FSN neighborhood. To order a movie, for example, the customer enters the Video Theatre venue and selects a movie. The movie request is first forwarded through the cable distribution system, through the demultiplexer to the ATM switch, and then to the media

Hardware and Software Vendors Involved in Time Warner's Full-Service Network

| Company | Product Offering |
|---|---|
| **Hardware Vendor** | |
| AT&T Network Systems | ATM switch — Globeview 2000 BroadBand System |
| Silicon Graphics Computer Systems | Servers; MIPS chip for set-top box |
| Scientific-Atlanta | Integration of advanced cable box with SGI; head-end equipment — outside plant amplifiers, laser transmitters, optical receivers, etc. |
| Toshiba | Digital tuning of home communication terminal/cable box |
| Hitachi | Building the demultiplexer to break DS3 streams into DS1 streams |
| Hewlett-Packard | Providing color printers to the homes; PA-RISC 3000 Series workstations to run the mail order and cataloging system software from Smith-Gardner to process and fill orders that come in on the FSN |
| **Software Vendor** | |
| Silicon Graphics | Operating-system software for server and set top; navigation system |
| Warner Bros. | Second navigation system for FSN |
| Time Warner Interactive | Conceptual design of navigation system |
| Ikonic Interactive | Multimedia company designing software/user interface for interactive-video, news-on-demand service |
| AND Communications | Working with Silicon Graphics to develop a navigation system |
| Medior | Working with Warner Bros. in the design and production of a navigation system and movies-on-demand interface |
| Andersen Consulting | System integrators |

*Source: LINK Resources Corporation, 1994*

servers (Challenge XL series), which will access the movie requested from the vaults that store the compressed digital video on magnetic hard drives.

The servers will access the information, put the data into ATM packets, and send the packets at OC3 bandwidth, 155Mbps, to the ATM switch. This switch automatically reads the packets and routes them at the DS3 rate of 45Mbps. These packets are later converted into radio-frequency signals and sent to the combiner, which completes the spectrum by adding the digital frequencies to the analog frequencies. The packets are then fed to the laser and transmitted through fiber-optic cable to the neighborhood node. At this point, the data packets are converted back to radio-frequency signals that are transmitted through coaxial cable to the user's home. The set-top box retrieves the ATM data packets, reassembles them as a data stream, decompresses the video, and displays the movie. Incredibly, it takes less than a second from the time a request is made to the time it is received.

The establishment of the FSN is part of a long-term plan by Time Warner Cable to have all of its operations FSN capable by the end of 1998. The company has completed installation of its Network Operations Center, which houses video servers and operating software from SGI and the first commercially available ATM switch from AT&T Network Systems.

One thousand people will be able to order different movies simultaneously. This limited customer base will enable Time Warner Cable and partners to evaluate the performance of each of its new services and the price/performance of the technology, such as storage capacity and chipsets.

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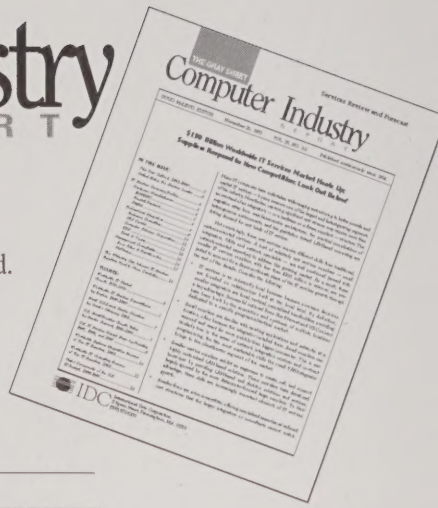


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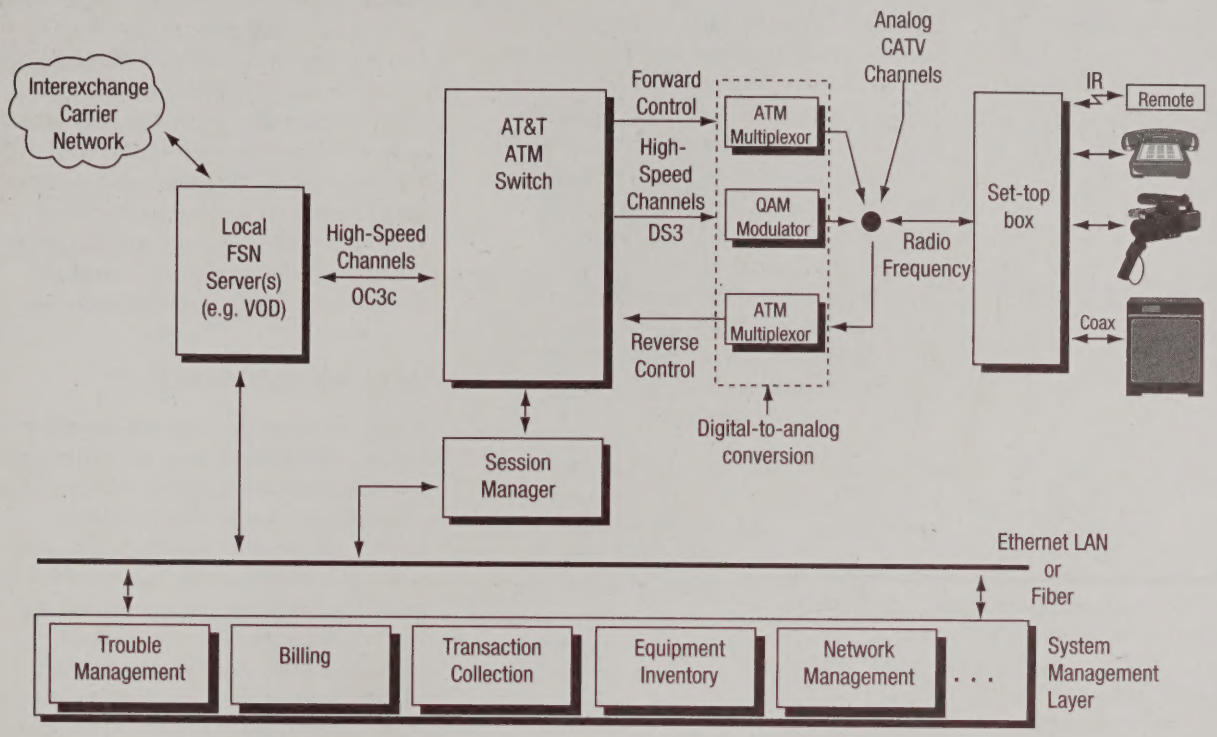
Time Warner Cable Full-Service Network Overview




Source: Time Warner Cable, 1994

Agreements have been reached with a number of companies to provide home shopping via the FSN including Spiegel/Eddie Bauer, Warner Bros. Studio stores, the U.S. Postal Service, ShopperVision (an interactive-TV supermarket and drugstore home-shopping service), and CUC International (a computerized shopping service with 250,000 brand-name products).

No additional fee will be charged for equipment provided to the home subscriber. Equipment will include an advanced cable box, a remote control, and in some cases, a color printer. Cost will be by transaction only. However, the FSN will offer a variety of pricing scenarios and will let consumers decide which one suits their needs.

## Siemens/Scientific-Atlanta/Sun Microsystems

Siemens Public Communications formed an alliance with Scientific-Atlanta and Sun Microsystems in November 1994 to deliver IMMXpress, a multimedia network architecture providing end-to-end multimedia network solutions worldwide.

The IMMXpress solution is a modular one and includes switching, access, CPE (set-top boxes), servers, cable telephony, and operation-support systems. Different components can be selected to support various network evolution plans, starting either from a central office or cable TV head-end point of view. Connections can be established from an EWSD central office switch, from a broadcast television signal to the access network, or by combining both broadcast and telephone signals in a head-end interface unit in the access network. Beyond this configuration, the addition of video servers and level-1 gateways will allow carriers to offer video-on-demand and interactive video services.

IMMXpress provides scalable video servers ranging in storage capacity from hundreds of megabytes to massive systems capable of scores of terabytes. Video can be stored on a variety of systems with different cost/performance characteristics including RAM-based video servers, disk

array-based video servers, and tape- or optical-based video archives.

Siemens will act as system integrator, providing expertise in the areas of ATM technology, network management, intelligent network call control, and MPEG encoding. GPT, a Siemens subsidiary, brings IN solutions and rapid service-creation facilities through multimedia INventor. Scientific-Atlanta will provide a full line of set-top terminals, cable telephony CoAxiom systems, hybrid fiber coax distribution systems, and head-end receiving and processing equipment. Video networking and video server technology will be provided by Sun Microsystems.

Sales of the EWSD switching technology have already been made to Century Telephone Enterprises. This Louisiana-based telephone company plans to install advanced telecommunications services throughout its 14-state telephone operating area. Shipments began in September 1994 and are expected to extend through the year 2000. With the installation of these central office systems, Century Telephone will be able to offer its subscribers advanced intelligent network (AIN) services and ISDN for business and residential applications.

According to IDC/LINK, video-on-demand contenders have a few years to sort things out. Combining LINK's "new video" (interactive TV: ranges from pay-per-view to video-on-demand and interactive education) and set-top box categories accounts for only 3%, roughly 2 million, households in the United States in 1996. By 1998, the "new video" and set-top box categories will account for 8% and 17%, respectively, of the 101 million households in the United States.

In relation to IMMXpress itself, no multimedia trials have yet been announced. However, the group is planning to focus on applications that include video-on-demand, interactive banking, distance learning, telemedicine (teleradiology), training and performance support, content production, and video and audio databases, to name a few.

## The Fed

Federal regulation continues to play a major role in determining the pace at which these video-on-demand trials can take place. The Federal Communications Commission has been steadily approving requests from different telephone companies across the United States, allowing them to provide interactive cable services to their customers. Although this continues to place telephone companies in direct competition with cable companies, it also creates the opposite synergistic effect. Partnerships between telco/cable operators have been brought about, with the aim of protecting and even increasing the potential markets of the partners involved. Moreover, such partnerships usually benefit from an exchange or merger in technologies and expertise.

## Why All This Fuss?

A number of motivations are responsible for the increase in alliance formation. Cable companies are concerned that they will be supplemented as providers of high-bandwidth capacity into the home and are actively looking for new sources of revenue. For computer companies and software developers, video-on-demand represents a new opportunity to enter another mass market. For systems vendors, especially producers of parallel systems, it is an excellent chance to move away from limited, nongrowth markets. Regional Bell Operating Companies, meanwhile, are searching for ways to offset revenue loss that may occur from the demonopolization of short-distance toll messages. Finally, entertainers and marketers see new ways to present their wares.

To determine success, alliances will need to evaluate the trials in terms of content provisioning and system performance while also factoring consumer feedback, both positive and negative. Introducing this new form of technology into the marketplace will change the traditional ways goods and services have been marketed and purchased. Therefore, it will take time to carefully sort out how to best apply this new medium of communication.

— Information in this issue of *The Gray Sheet* is based on two bulletins from LINK Resources Corporation: *Alliances — the Building Blocks to Video-on-Demand* (LINK #0568) and *Video-on-Demand — the Trials of Not Going It Alone* (LINK #0569). Please contact Linda Rich at 508-935-4389 for more information.

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# Closer Is Better: Success in IT Services Entails New Strategies

The worldwide market for information technology services (ranging from IT strategy consulting to farming out IT operations) is, by any measure, a huge beast. Billion-dollar, multiyear, multidimensional contracts — difficult to thoroughly analyze and nearly larger than life — are the norm.

Although exceptionally large, the services market is hardly ponderous. Over the past 12 months the nature of the supplier-buyer relationship has undergone a fundamental shift. Suppliers are not just suppliers any longer, but partners and collaborators. "Close" is the word in the services business. Customers demand that services suppliers understand not only their market but the idiosyncrasies of their particular business. Gone are the days when blue-suited drones can take control of an IT shop and achieve significant cost cutting by applying the same cookie-cutter solutions they developed down the street.

As a result, a company seeking to address the rapidly growing market for IT services (forecasted at 15% worldwide, 17% U.S. through 1998) must be nimble. Interestingly, AT&T has recently formed an entire new business called AT&T Solutions to address this opportunity. Other types of IT suppliers — from hardware companies to channel partners and services providers — are under similar pressure to adapt. Note the following recent changes:

- **Customers, not products.** IBM's new worldwide organizational structure focusing on specific customer types is among the most visible signs of the end of the old Big Blue. Teams of industry and customer experts circling the globe, answering specific client needs, with little or no allegiance to geographic "trading area" fiefdoms are a step in the right direction. And it could be the signal of IBM's transition to a services-driven company.
- **In and out.** Digital's strategy has changed enough to remain somewhat confusing. At one time the vendor's consulting and integration efforts were a separate division; now they are back in the vendor's systems group. Although Digital's

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operation has multivendor capabilities, it is focusing primarily on Digital customers.

- **Generalists to specialists.** The aim of EDS's intensive training course used to be to develop highly skilled, technically savvy employees who could do anything. The goal? To create a crack-shot team of experts that could be applied to solve any problem. Now the focus is on addressing very specific client needs. EDS has realized that IT is so diverse, and customers' needs are so varied, that an equally diverse workforce of complementary specialists is required.

- **Specific-solution focus.** Andersen Consulting's recently formed SAP Business Organization focuses on selling services to a very specific manufacturing clientele running SAP systems. Logistics systems expertise is not enough — nor, even, is manufacturing prowess. Andersen has seen fit to establish a business unit entirely focused around a single type of installation. That's nimble.

The reasons for these kinds of moves are clear: services are a large and growing opportunity. From 1993 to 1994, global spending for outside services grew 7.6%, reaching $165 billion. The worldwide services market will grow to a whopping $245 billion in 1999, and U.S. IT services revenue is projected to grow from $76.4 billion in 1995 to $110.7 billion in 1999.

Within that bulk are dozens of smaller and well-defined niche markets. IDC carves the IT services pie into five broad parts: operational services, maintenance and support, implementation services, planning services, and IT training and education.

The maintenance and support category has always been the largest. In fact, this meat-and-potatoes category remains the biggest through the end of the forecast period, growing from U.S. revenues of $26.6 billion in 1994 to $31.9 billion in 1998. Maintenance and support has also had flat growth for some time, though, and is actually the slowest growing of the service activities. High-growth IT services categories include operational services and planning services.

This issue of *The Gray Sheet* will highlight factors driving growth and key trends in three of the most rapidly changing services areas: consulting, integration, and operations management and outsourcing.

## Consulting: the Lines Continue to Blur

Consulting revenue in the United States is expected to nearly double from roughly $8 billion in 1994 to more than $15 billion in 1999. Meanwhile, worldwide IT consulting revenue is forecasted to grow from $17 billion in 1994 to nearly $29 billion in 1999. Like the outsourcing services market, the IT consulting services segment is relatively young and fast growing with a 1994–99 CAGR of 14.0%. In contrast, the massive maintenance and support portion has a 1993–98 CAGR of just 4.5%.

The IT consulting market consists of 11 service segments. Design, IT strategy, process improvement, and operations assessment are the largest. However, business process reengineering, change management, process improvement, and IT strategy are growing more quickly. In short, customers' needs are maturing. As much as clients truly value IT design and strategy services, they are increasingly interested in offerings more directly related to their businesses.

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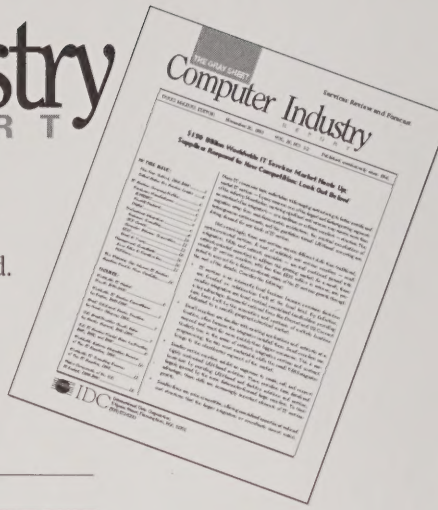


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## U.S. Services Market by Major Activities, 1988–1998 ($M)

| | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | CAGR (%) 1988–98 | CAGR (%) 1993–98 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Operational services | 3,893 | 4,550 | 5,711 | 6,761 | 7,862 | 8,812 | 10,056 | 11,970 | 13,983 | 16,337 | 18,884 | 17.1 | 16.5 |
| Maintenance and support | 21,865 | 22,501 | 23,077 | 23,808 | 24,858 | 25,537 | 26,622 | 28,155 | 29,515 | 30,772 | 31,854 | 3.8 | 4.5 |
| Implementation services | 8,754 | 9,902 | 11,186 | 12,541 | 14,170 | 15,788 | 17,694 | 19,819 | 22,174 | 24,747 | 27,293 | 12.0 | 11.6 |
| Planning services | 3,523 | 4,092 | 4,719 | 5,376 | 6,152 | 6,910 | 7,939 | 9,098 | 10,390 | 11,855 | 13,282 | 14.2 | 14.0 |
| IT training and education | 2,967 | 3,330 | 3,768 | 4,325 | 5,005 | 5,863 | 6,525 | 7,310 | 8,307 | 9,268 | 10,189 | 13.2 | 11.7 |
| Total | 41,001 | 44,375 | 48,461 | 52,811 | 58,048 | 62,910 | 68,836 | 76,353 | 84,369 | 92,979 | 101,502 | 9.7 | 10.0 |

*Source: International Data Corporation, 1994*

## Worldwide Services Market, 1989–1999 ($M)

| | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | CAGR (%) 1989–99 | CAGR (%) 1994–99 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| United States | 44,375 | 48,461 | 52,811 | 58,048 | 62,911 | 68,836 | 76,354 | 84,369 | 92,979 | 101,502 | 110,701 | 9.6 | 10.0 |
| Western Europe | 40,180 | 42,661 | 45,326 | 48,191 | 47,700 | 51,955 | 55,159 | 58,500 | 61,914 | 65,298 | 68,431 | 5.5 | 5.7 |
| Japan | 23,319 | 25,171 | 27,213 | 29,467 | 31,623 | 31,351 | 32,360 | 33,325 | 35,784 | 38,096 | 40,692 | 5.7 | 5.4 |
| Latin America | 1,443 | 1,686 | 1,988 | 2,366 | 2,778 | 3,228 | 3,793 | 4,417 | 5,066 | 5,834 | 6,807 | 16.8 | 16.1 |
| Asia Pacific | 1,365 | 1,593 | 1,872 | 2,218 | 2,525 | 3,029 | 3,551 | 4,171 | 4,857 | 5,708 | 6,730 | 17.3 | 17.3 |
| Rest of world | 2,909 | 3,418 | 4,043 | 4,814 | 5,471 | 6,190 | 7,022 | 7,960 | 8,980 | 10,397 | 12,093 | 15.3 | 14.3 |
| Total | 113,591 | 122,990 | 133,254 | 145,104 | 153,008 | 164,589 | 178,239 | 192,741 | 209,580 | 226,835 | 245,454 | 8.0 | 8.3 |

*Source: International Data Corporation, 1994*

Top 10 U.S. Consulting Firms by Revenue, 1994

| Vendor | Revenue ($M) | Market Share (%) |
|---|---|---|
| CSC | 920 | 11.6 |
| IBM | 765 | 9.6 |
| Andersen | 574 | 7.2 |
| EDS | 261 | 3.3 |
| Hewlett-Packard | 221 | 2.8 |
| Unisys | 191 | 2.4 |
| GTE | 190 | 2.4 |
| Oracle Consulting | 186 | 2.3 |
| Ernst & Young | 170 | 2.1 |
| Deloitte & Touche | 122 | 1.5 |
| Top 10 total | 3,600 | 45.3 |
| U.S. total | 7,939 | |

*Source: International Data Corporation, 1995*

## IBM/ISSC

**1993 Revenue:** $15.9 billion

**1994 Revenue:** $15.8 billion

**Key vertical markets:** IBM's target verticals for IT services include manufacturing, financial services, insurance, health care, and the public sector.

**Other strengths:** Breadth of products and services, experience in performing integration and consulting services.

**Outlook:** IBM recently reorganized its sales force from a product focus to a worldwide industry (vertical) focus.

Perhaps the most important force driving greater spending on IT consulting is the intimate tie between information technology and an organization's long-term success. Few organizations possess expertise in designing systems with multiple technologies. Even fewer understand how technologies can be implemented in a fashion that will maximize either competitiveness or investment return. Consequently, demand is high for consultants with a combination of business and technology expertise to provide advice on IT strategy and benchmarking in addition to how technology can improve business performance. As a result, IT consultants are now expected to offer not only IT expertise, but also services similar to those of general business consultants.

Given the importance of information technology to organizations, IT consultants will need to partner even more closely with clients in the future. Consider the following IT consulting market trends:

- IT planning and design remain the most important services to large and small IT buyers in almost every vertical market around the globe according to IDC's *1994 U.S. Global IT Survey*.
- Service providers expect IT consulting to account for a growing portion of their overall professional service activity and revenue. Except for consultants and outsourcers, all providers expect to do more consulting in the future. The most dramatic change is expected in the vendor/OEM category.
- IT suppliers continue to provide more process expertise, such as process improvement and reengineering services. For many vendors, these are new areas of expertise.
- The largest service companies believe they need to develop vertical market expertise. Size alone will no longer ensure success in consulting. Specific industry expertise allows larger suppliers to combine consulting recommendations with integrated solutions.

## Hewlett-Packard

**1993 Revenue:** $4.8 billion

**1994 Revenue:** $5.7 billion

**Key vertical markets:** Worldwide focus is on manufacturing, telecommunications, and financial services. Other verticals are determined by geography and business concentration.

**Other strengths:** Unix leadership in systems, resource management, and network management software.

**Outlook:** HP is adding a systems and network management focus; previously, the vendor primarily concentrated on downsizing.

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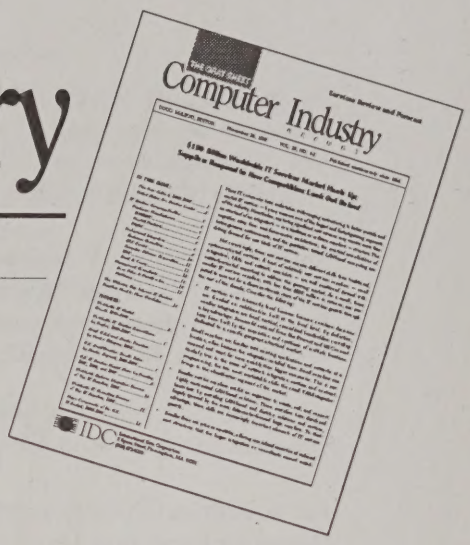

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## Digital

**1993 Revenue:** $6.4 billion

**1994 Revenue:** $7.1 billion

**Key vertical markets:** The company's professional services business includes systems integration, business consulting, and training in Digital's traditional areas of expertise — manufacturing and scientific/engineering. Emerging markets include health care, financial services, and telecommunications.

**Other strengths:** The distributed nature of its technology and the preponderance of Digital equipment in heterogeneous environments invite integration services.

**Outlook:** Digital's consulting and outsourcing strategies are unclear, especially in non-Digital environments; the vendor has, however, reorganized to improve top-1,000-account service.

## Diffused IT Decision Making: an SI Bonanza

Worldwide systems integration (SI) revenue is expected to grow from $29 billion in 1994 to $48 billion in 1999. In the United States, IDC forecasts that revenue for system integration services will jump from $16 billion in 1994 to $28 billion in 1999. Compared to consulting and outsourcing, the integration services (IS) market is the most mature. Nonetheless, relative to the broader IT services market (which has a CAGR of 10.0% in the United States from 1993–98) integration is growing with the pack as evidenced by its CAGR of 11.8% from 1994–99 in the United States.

Traditional forces like downsizing and the complexity of heterogeneous computing environments continue to drive SI growth. However, the strategic nature of IS departments, expansion of the customer base beyond MIS, and additional business generated by strong consulting demand are also shaping the market:

- As firms continue to invest in IT, their expectations rise. As a result, IS departments need to move beyond basic operations. Managers of IS departments must make decisions that define and affect the organization's core strategy. Increasingly, IS shops are leveraging external expertise and offloading tasks like integration work so they can stay strategically focused.
- The past year has also shown that SI buying is expanding outside MIS and throughout many layers of user organizations. As a result, and in addition, integration projects become even more complex, and sales cycles are lengthened.
- Strong demand for IT consulting is also generating additional need for system integration services. Because most IT consulting projects contain integration, as IT consulting demand grows, so does integration. Some of the integration business may be captured by the firm that provided the consulting, as in the case of a broad-based provider like CSC, but in other cases another firm (or host of firms)

Top Ten U.S. Services-Related Systems Integrators by Revenue, 1994

| Vendor | Revenue ($M) | Market Share (%) |
|---|---|---|
| IBM | 1,742 | 11.0 |
| EDS | 989 | 6.2 |
| Andersen | 845 | 5.3 |
| Martin Marietta | 731 | 4.6 |
| Digital | 659 | 4.2 |
| CSC | 637 | 4.0 |
| Hewlett-Packard | 627 | 4.0 |
| Unisys | 424 | 2.7 |
| PRC | 395 | 2.5 |
| SAIC | 373 | 2.4 |
| Top 10 total | 7,422 | 46.8 |
| U.S. total | 15,867 | |

*Source: International Data Corporation, 1995*

## Andersen Consulting

**1993 Revenue:** $2.7 billion

**1994 Revenue:** $3.1 billion

**Key vertical markets:** Broad-based market expertise, including banking and financial services, manufacturing, government, telecommunications, and wholesale/retail. Andersen Consulting develops products in an array of technology segments including networking, client/server, GUIs, multimedia, and artificial intelligence.

**Other strengths:** International positioning

**Outlook:** Andersen's European practice has improved; double-digit growth has returned.

## Cap Gemini

**1993 Revenue:** 2.0 billion

**1994 Revenue:** 2.1 billion

Key vertical markets: Cap Gemini is an exclusively commercial integrator and has purposely avoided public-sector clients.

**Other strengths:** Software technology is the company's strength, opening the door to outsourcing opportunities in application maintenance and support.

**Outlook:** Cap Gemini has acquired strong software-development capabilities and an impressive management consulting organization. The vendor's sales increased by 4.2% in 1993/1994, including a profitable second half, and its outsourcing business grew 30%. Cap Gemini also has undergone a "radical restructuring," which it calls the Genesis Program. Future performance is unclear.

may gain the work. Service providers indicate that growth in consulting is generating quite a bit of integration business. However, given the varied linkages between consulting projects and the resulting integration, so far IDC is unsure of how much is hype and how much is real new business.

In fact, the systems integration market — like the broader IT service business — is polarizing to general service providers on the one hand, and specialized, more vertical players on the other. At the same time, customers are also demanding greater flexibility across this spectrum. Thus, whereas the integration market is growing as a whole, the requirements of doing business are changing. Here are some key systems integration market trends:

- Companies that have the most aggressive plans for IT spending are investing in external systems integration services. As businesses mature in their use of IT, offloading integration becomes more attractive.
- Use of external systems integration services varies considerably by industry. Firms in the wholesale/retail and banking industries are frequent users, but companies in the insurance and transportation fields tend to look internally for support.
- Fixed-price and fee-for-service (time and material) contracts continue to dominate as pricing strategies. Contracts vary significantly by provider segment as a percentage of overall contracts. For example, consultants, outsourcers, and systems integrators have the lowest percentage of fixed-price contracts; VARs, software vendors, and independents have the highest.
- Positioning as a general vs. a specialized service provider continues to vary by provider size. As expected, large providers position themselves as having the broadest service capability, and small players have the narrowest range of services offered.
- Independent service providers and consultants offer the most customized service solutions and VARs the most packaged ones. As the services market matures, vendors are positioning themselves to provide a specific type of service.
- Gross margins for systems integration currently range between 25% and 50%. IDC will be investigating this point more thoroughly in the future, but preliminary results show that the range of gross margins varies about 15% across provider types.

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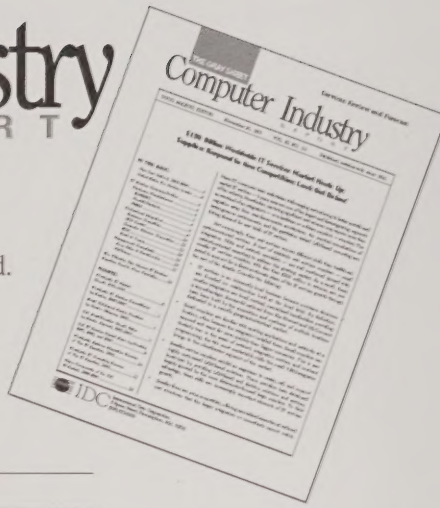


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## Outsourcing: IT Services Sweetheart

Outsourcing remains among the fastest-growing components of the worldwide services industry. The outsourcing services market is the hottest of the hot, with a CAGR in the United States of 16.0% for 1994–99.

How realistic is this kind of growth? Three factors may limit outsourcing's expansion:

- Customers are becoming concerned with the value of outsourcing as opposed to simply its cost: to what degree does outsourcing really allow them to focus on their core businesses and competencies?
- Many organizations are concerned about losing flexibility in technology decisions.
- Long-term pricing agreements locked vendors and customers into prices that have become inappropriate.

Despite these potentially limiting factors, the outlook is strong. Outsourcing makes good business sense. Activities like network services, help-desk operations, and disaster recovery plans remain a function of economies of scale; consequently, outsourcers can offer user organizations great cost savings.

But there's more. Over the past year, relations between buyers and sellers have matured. Vendors and clients are moving toward a partnership approach, fueled by common incentives, and on the foundation of a joint vision and mutual values. They have built practices that encourage flexibility and trust: requirements for today's dynamic outsourcing arrangements. Outsourcing suppliers can introduce their clients to additional savings.

Finally, information technology is of growing importance to businesses. Not only is the importance of IT becoming clearer to senior management, but the accelerated turnover of IT and the premium placed on outsourcing talent are making it difficult for IS organizations to retain best-of-breed organizations and architectures. Instead, customers want to focus on, and invest in, their core competencies and leave information planning and delivery to others.

The net result is indeed a very strong outlook for the outsourcing market. Worldwide outsourcing services revenue will grow from $18 billion in 1994 to nearly $33 billion in 1999. The U.S. portion is expected to double from roughly $8 billion in 1994 to almost $16 billion in 1999.

### Computer Sciences Corporation (CSC)

**1993 Revenue**: 2.5 billion

**1994 Revenue**: 3.1 billion

**Key vertical markets:** Commercial business now accounts for about 55% of total revenues. Federal business accounts for the remainder.

**Other strengths**: CSC is strong in the broad spectrum of outsourcing consulting/business reengineering and facilities management services that are well suited to the evolving needs of commercial customers.

**Outlook:** In light of its aggressive acquisition strategy and successful consulting business, CSC will be in good shape if it can successfully integrate the acquisitions over the long run. In short, CSC is well positioned for continued growth.

Top 10 U.S. Outsourcing Firms by Revenue, 1994

| Vendor | Revenue ($M) | Market Share (%) |
|---|---|---|
| EDS | 2,545 | 33.8 |
| IBM | 853 | 11.3 |
| CSC | 675 | 9.0 |
| Systematics | 373 | 5.0 |
| Martin Marietta | 302 | 4.0 |
| Unisys | 235 | 3.1 |
| Digital | 180 | 2.4 |
| PRC | 156 | 2.1 |
| Affiliated Computer Systems | 149 | 2.0 |
| Analyst International | 132 | 1.8 |
| Top 10 total | 5,599 | 74.4 |
| U.S. total | 7,523 | |

*Source: International Data Corporation, 1995*

## EDS

**1993 Revenue:** 4.2 billion

**1994 Revenue:** 5.3 billion

**Key vertical markets:** O.K.

**Other strengths:** Size, breadth of services

**Outlook:** EDS has combined solid international growth. Very strong earnings and growth this year.

## Booz Allen & McKinsey

Traditional management consultants seem to be moving away from information technology consulting in the traditional sense. Consulting customers value high-level consulting services; nevertheless, they do not necessarily place a premium on technical consulting. Instead, these firms are strengthening their reimplementation skill sets (developing IT strategies and picking vendors, for example).

To succeed in the complex, but lucrative, outsourcing market, suppliers need to recognize the following:

- Rapidly changing requirements and cost structures for information technology are forcing a change in the relationship between the outsourcer and the customer. Dynamic partnerships are required.
- The banking and communication industries have the highest percentage of moderate-to-heavy usage of external data-center outsourcing services. Although other growth areas are likely to appear, these are the current cash-cow markets.
- Companies' needs for information and solutions are increasing, including the desire for access to top-notch technology. The result is that outsourcing contracts have evolved away from mere low-cost service and toward solutions to real business problems. Cost is still important, but results make for lifelong customers.
- Customers are expecting more from their outsourcers. For example, the percentage of outsourcing contracts containing network management, application design and maintenance, and distributed systems management services is increasing. Application services have not always been considered an outsourcing activity. Two factors explain the current interest. Customers are looking to outsource existing applications as they migrate to new applications and architectures. And, it is increasingly difficult to attract outside talent for systems development.

Because demand is so strong, the outlook for providers of the entire spectrum of IT services is bright. To capitalize on this demand, however, IT service vendors must partner with their customers. Such partnerships require that vendors not only be fleet of foot, but that they also know more. A firm grasp of IT and a track record of applying it are no longer enough. To be successful, IT service providers must demonstrate knowledge of the client's particular business and the capacity to combine that wisdom with IT prowess to produce a tailored solution.

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# Double-Digit IT Revenue Growth Supports Net Income Turnaround; Positive Trends Continue Through 1995

By nearly any measure, 1994 was a good year for information technology. The approximately 200 publicly traded U.S. vendors in IDC's database recorded an impressive 13% increase in revenues in 1994 and a major turnaround in net income from -$9.7 billion in 1993 to $29.8 billion in 1994. A rare combination of strong global economies and major waves of IT market expansion will fuel continued growth at least through 1995. In fact, the U.S. IT market will grow another 9% in 1995, following 10% growth in 1994, while the world market expands by 8%. U.S. vendors will continue to prosper as they amass worldwide market share.

Several mutually reinforcing positive factors lifted the information technology industry into one of its most successful growth stages in 1994 and are expected to sustain the market's momentum at least through 1995:

- A well-structured global economic expansion, which has spread to most world regions
- An optimistic outlook for a successfully orchestrated soft landing in the United States, quelling any fears of a near-term market downturn
- A widening base of IT end-user markets and growing IT demand supported by a stable business environment
- A shift in IT vendor focus from limited and saturated technical and government markets to commercial markets — markets that are increasingly competing on speed and the flexibility of both service and product delivery
- An improving IT-product price/performance level, which is cultivating healthy supply competition that is in balance with market demand

March 17, 1995 Vol. 30, No. 7-8

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- A growing base of service providers who are educating the commercial market and creating awareness of innovative IT solutions that can improve competitiveness

These positive factors were strong enough to help lift the financial results of even the most troubled IT vendors in 1994. The roughly 200 publicly traded U.S. vendors in our database recorded a 13% increase in revenues in 1994 and a major turnaround in net income from -$9.7 billion in 1993 to $29.8 billion in 1994. Discounting the revenues of semiconductor manufacturers (to avoid a double counting of the total IT market) the revenues of the remaining IT hardware, software, and services vendors still climbed 15%.

All major IT sectors managed to expand revenues at double-digit rates, with the exception of telecommunications and computer systems, which both grew by 7%. However, even the revenues of system vendors jumped 12% in 1994, discounting beleaguered IBM. IT market sales growth was led by the multimedia sector, where revenues doubled, and the data communications market, which expanded nearly 40%. The PC and semiconductor sectors also recorded strong gains with each advancing nearly 30%.

The good news is expected to continue. In the fourth quarter, momentum toward positive financial results was still building: total vendor revenues expanded 15% from a year ago, and net income soared a whopping 174%. In addition, most major world regions are reporting favorable economic news. Western Europe is pulling out of its prolonged recession, Japan is rebounding from its brief yet steep downturn, and solid economic growth continues in the United States. Expansion in the second-tier markets of Latin America (with a few notable exceptions), Southeast Asia, and Eastern Europe lend additional support.

Furthermore, all major IT markets and technologies are strong, including client/server systems and applications, data communications, the home market, wireless technologies, the Internet, Pentium, and CD-ROM. Penetration of IT solutions in the commercial market, especially in the communication and high-volume data-manipulation categories, will also contribute to steady market growth.

Given the current market characterized by strong demand and healthy competition, IT vendors may be tempted to try to gain share by promising the swift delivery of all-encompassing solutions to broadening end-user requirements. The challenge will be to gain new customers prudently and effectively while retaining an increasingly demanding existing customer base. Today's large and successful traditional vendors have established their reliability over the long run, recovering from past mistakes. But as both competition and demand reach new heights this year, failure to deliver will be more costly than ever.

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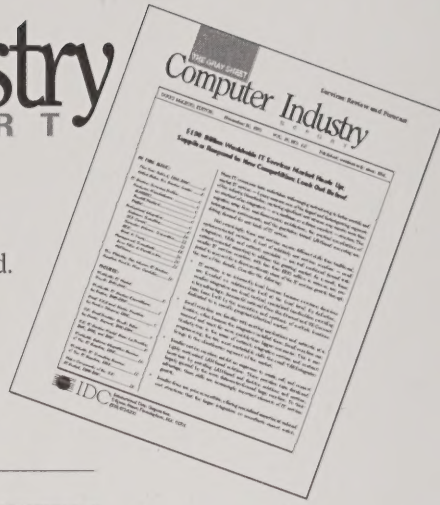


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Volume 30, Number 7–8

## Computer Systems

Worldwide multiuser system sales slipped by over 3% in 1994 and are expected to flatten in 1995. However, the diversified product base of the U.S. system vendors in our database — and their ability to build worldwide market share — resulted in better-than-average revenue growth. Total revenues for these major U.S. system vendors climbed 7% for all of 1994 while year-over-year growth strengthened to 9% in the fourth quarter. With the support of IBM's budding financial recovery, net income for the total sector jumped from a deficit of $7.4 billion in 1993 to $3.8 billion in 1994, despite the handicap of Digital's $2 billion net loss for the year.

Successful vendors were able to persevere due to (1) significant improvements in the price/performance of their products, (2) diversification of their product portfolios to target commercial markets, and (3) emphasis on flexible solutions marketed under the client/server umbrella. System companies will continue on this path that brought them success in 1994, but the inevitable result will be greater competition and lower margins as the commercial market is courted by more vendors. An industry shakeout has already taken place, and so in 1995 the remaining system companies can expect a moderate level of competition that will permit another year of solid financial gains. Nonetheless, they will have to target customer markets carefully to take advantage of their own efficiencies in the long term.

The mainframe market was given a reprieve in 1994 as mainframe vendors adjusted pricing structures to answer the challenge of more cost-effective technology substitutes in the midrange market. Fortunately for these vendors, customers' investment decision processes have been sluggish enough to allow them time to react and realign their products' price/performance structures. Mainframe pricing has declined dramatically over the past year, narrowing the cost-to-use gap between mainframes and client/server architectures. In fact, competition based on price has already shaken vendors such as Digital, ICL, and Bull from the mainframe market. The remaining vendors have deep enough pockets to weather the weak market and can still profitably service their existing customer base.

IBM's first increase in annual revenues since 1990 highlighted the market's improvement in 1994. Although Big Blue's revenue growth of 2% was slower than average for system vendors, the company's actual dollar expansion of $1.3 billion exceeded the total annual sales of most other system vendors, including Data General and Silicon Graphics, and nearly eclipses Amdahl's $1.6 billion in revenues.

Most of IBM's product lines are coming into line with the company's growth plans. AS/400 and RISC System/6000 unit sales grew at double-digit rates in 1994, triggered by aggressive pricing. The combination of rising orders and the reduction in production capacity has also extended mainframe backlogs well into the second quarter, allowing Amdahl to benefit from overflow demand for now. Although falling prices shrank margins on high-end products, IBM's restructuring efforts allowed it to rebound from its $8.1 billion loss in 1993 to a $3 billion annual net gain in 1994, its first since 1990.

In 1995, mainframe revenues will continue to shrink, and more aggressive pricing will lead to a further moderation of margins for large systems. In the midrange, IBM's new low-end AS/400 product introduction is expected to succeed by winning over old System/36 customers that thus far have been reluctant to make upgrade investments. Meanwhile, IBM's R&D efforts are focused on transitioning all of its system lines to CMOS technology. Once they successfully achieve the same performance capabilities as current bipolar models, we can look for the resulting

full line of CMOS systems to develop economies of scale over the next few years that will give IBM an advantage in the price/performance war.

Hewlett-Packard, meanwhile, has played out its diversified product approach perfectly. The company has been on a roll: solid gains in printer, server, Unix-workstation, and PC markets lifted revenues by 24% in 1994. After learning a few strategy lessons, an envious Digital is finally attempting to follow HP's lead and diversify its product base in the commercial market. While reorganizing its cost structure, the company is attacking the market with more competitive price points. This shift in strategy was apparent in 1994 as PC sales accounted for 25% of the company's total revenues — more than the contribution from either VAX or Alpha.

If Digital is successful with this approach, the company will be able to reference 1994 as the year in which it got back on track. After all, in the fourth quarter revenues climbed 7% compared to a year ago, and a profit was posted for the first time in the last five periods. In the coming year, Digital's ability to succeed with aggressive pricing, expanded distribution channels, a wider base of products, and higher sales volume will be tested. Obstacles that Digital must overcome include the lack of a software strategy and an inefficient management-decision-making process.

Although the technical market may be static, a repositioning of vendors is expected to occur. In the past when Digital expanded into the commercial market, it neglected its traditional technical customers. In fact, Sun won half of its market as a result of this lack of focus. Digital remains vulnerable because it is still struggling to gain full competitive strength in the commercial market.

Ironically, Sun may be falling into the same trap. As the company gives in to the lure of the commercial market, it risks alienating its traditional technical customers, creating an opportunity for Silicon Graphics to gain dominance. In fact, SGI is primed to succeed by delivering superior products and service to the technical market. Thus, while Sun shifts its focus to the commercial market, it will need to tailor its marketing strategy carefully.

The supercomputer market faces its own unique set of dynamics; however, it hasn't been able to avoid the requirements for vast improvements in price/performance. Although Tandem's Himalaya line has found success in 1993 and 1994, unit sales have had to double to match the revenue of old product lines. The required increased sales volume will crowd out additional vendors from the market.

Momentum is building in the massively parallel processing market driven by vast commercial-market data warehousing and data mining activities, which are raising system capability requirements. Although an opening into the commercial market has appeared, and IBM has high expectations for its SP2, a dearth of programming talent poses a significant barrier to entry for many.

## Personal Computers

The PC industry had an outstanding 1994. Our composite of seven publicly held companies reflects nearly 30% annual revenue growth and roughly five points of margin expansion over a year ago. The largest "payoff" came to suppliers that invested in the consumer market either through multimedia-equipped systems or aggressive Pentium deployment.

Nonetheless, the overall business market was a consistent contributor, with strong performance from the small business segment offsetting the negative implications of downsizing and saturation in medium-to-large companies. In the business segment, success was a function of timely product-line refreshes for desktop systems and solid

## Revenue, Net Income, and Pretax Income Summary for 4Q94 and 4Q93

| | Revenue ($M) | | | Net Income ($M) | | | Pretax Income ($M) | | |
|---|---|---|---|---|---|---|---|---|---|
| | 4Q94 | 4Q93 | % Change | 4Q94 | 4Q93 | % Change | 4Q94 | 4Q93 | % Change |
| System vendors | 38,466.8 | 35,202.0 | 9.3 | 2,071.7 | 812.9 | 154.8 | 3,354.9 | 1,514.1 | 121.6 |
| System vendors w/AT&T GIS (NCR) | 40,006.8 | 36,442.0 | 9.8 | n/a | n/a | n/a | n/a | n/a | n/a |
| System vendors w/o IBM | 18,569.8 | 15,806.0 | 17.5 | 841.7 | 430.9 | 95.3 | 1,281.9 | 851.1 | 50.6 |
| PC vendors | 8,699.9 | 6,733.5 | 29.2 | 510.2 | 255.6 | 99.6 | 746.3 | 370.3 | 101.6 |
| System vendors and PC manufacturers | 47,166.8 | 41,935.5 | 12.5 | 2,581.8 | 1,068.5 | 141.6 | 4,101.2 | 1,884.4 | 117.6 |
| Storage | 4,089.3 | 3,167.4 | 29.1 | 148.6 | (85.8) | n/a | 173.7 | (45.8) | n/a |
| LAN hardware | 1,883.3 | 1,414.3 | 33.2 | 109.0 | 167.3 | -34.9 | 199.7 | 285.6 | -30.1 |
| LANs w/software | 2,523.5 | 2,025.4 | 24.6 | 201.9 | 274.5 | -26.5 | 338.8 | 432.0 | -21.6 |
| Other data communications | 526.8 | 357.9 | 47.2 | 62.3 | 37.9 | 64.3 | 95.1 | 56.5 | 68.2 |
| Total communications | 2,410.2 | 1,772.2 | 36.0 | 171.3 | 205.3 | -16.5 | 294.8 | 342.1 | -13.8 |
| Multimedia | 463.0 | 231.8 | 99.8 | 28.2 | 30.8 | -8.3 | 38.7 | 36.0 | 7.5 |
| Telecommunications | 47,426.6 | 43,778.9 | 8.3 | 3,948.4 | 45.0 | 8,664.7 | 5,189.2 | 1,489.0 | 248.5 |
| Software | 7,048.7 | 5,797.0 | 21.6 | 911.1 | 588.4 | 54.8 | 1,484.1 | 1,030.8 | 44.0 |
| Application solutions | 2,006.9 | 1,720.9 | 16.6 | 110.9 | (115.6) | n/a | 153.9 | (40.8) | n/a |
| Application tools | 1,651.6 | 1,327.4 | 24.4 | 141.1 | 132.8 | 6.2 | 233.2 | 210.6 | 10.7 |
| System software and utilities | 3,390.2 | 2,748.7 | 23.3 | 659.1 | 571.2 | 15.4 | 1,097.1 | 861.0 | 27.4 |
| Software w/IBM software revenue | 10,330.7 | 8,866.0 | 16.5 | n/a | n/a | n/a | n/a | n/a | n/a |
| Services | 5,860.6 | 4,620.4 | 26.8 | 454.9 | 352.6 | 29.0 | 698.3 | 550.9 | 26.7 |
| Semiconductors | 15,096.2 | 11,798.8 | 27.9 | 1,446.8 | 1,306.3 | 10.8 | 2,206.4 | 1,956.4 | 12.8 |
| Total w/o semiconductors | 119,197.4 | 105,198.4 | 13.3 | 8,330.0 | 8,470.4 | -1.7 | 12,130.9 | 5,396.5 | 124.8 |
| Total w/o IBM | 114,396.6 | 97,601.2 | 17.2 | 8,546.7 | 3,189.1 | 168.0 | 12,264.3 | 6,689.9 | 83.3 |
| Total w/o semiconductors or telecom | 71,770.7 | 61,419.6 | 16.9 | 4,381.5 | 2,219.8 | 97.4 | 6,941.7 | 3,907.5 | 77.7 |
| Total w/o telecom | 86,866.9 | 73,218.3 | 18.6 | 5,828.3 | 3,526.0 | 65.3 | 9,148.1 | 5,863.9 | 56.0 |
| Total | $134,293.6 | $116,997.2 | 14.8% | $9,776.7 | $3,571.1 | 173.8% | $14,337.3 | $7,352.9 | 95.0% |

*Source: International Data Corporation, 1995*

execution with server and premium notebook products. In the portable market, IBM and Toshiba were big winners.

Nowhere was the positive consumer influence more evident than in the dramatic growth of Packard Bell. In CY4Q94 the consumer PC powerhouse became the number one supplier of PCs in the United States based on unit volume, with virtually no business presence. Compaq was close behind at retail and, based on admirable strength in all segments (except perhaps portables), snatched the number one spot both in the United States and worldwide.

Gateway 2000 prospered on the strength of an aggressive Pentium ramp (Pentium systems represented more than half of fourth-quarter volumes), tapping into strong consumer demand. Recent expansion into Europe also fueled growth by adding incremental revenues — and more recently, profits. In our view, the company continues to have an opportunity to gain worldwide market share over the next 12 months, especially as international markets cozy up to the concept of direct sales.

For both Dell and Apple, 1994 was a year of new business models and new product strategies. Dell gained momentum largely through performance-centric enhancements; it was among the most aggressive Pentium proponents. The company also engineered a remarkable turnaround in portables with notebook sales accounting for 14% of system volume in Q4. In Apple's case, profitability was substantially improved versus a year ago on the strength of new higher-margin products and stringent cost control. Still, Apple left some business on the table as it underforecasted demand for PowerBook 500 notebooks and multimedia-equipped Power Macintosh desktops. Looking forward, we expect both companies to continue to be challenged by the competition, and they will need to step up promotional and channel activities to grow on par with the industry. Dell, especially, may find it difficult to achieve continued growth with its direct-response–centric strategy; long term, a channel expansion will be required.

More of the same is in store for 1995. Growth will remain a function of consumer buying and portable acceptance although Windows 95 (depending on shipment) could provide a sales boost. As was the case in 1994, competitive urgency will accelerate product change, which we expect to result in unprecedented improvements in PC price/performance. New microprocessors, graphics capabilities, storage devices, and display technology will all contribute to this opportunity.

## Storage

Impressive growth in the PC market drove the storage industry to record levels for both CYQ4 and 1994 overall. Winchester drive manufacturers and component suppliers were able to add $3 billion to annual industry revenues based on 34% year-over-year growth in unit sales. Pricing (the second key variable), however, detracted from this otherwise remarkable performance. As hard-drive capacity points came into the PC mainstream, and thus hit big volumes, declines in average selling prices were in excess of 30% per year.

Several themes distinguished market leaders for both CYQ4 and the year as a whole, among them: (1) a solid OEM customer base, (2) low-cost manufacturing, and (3) a broad product line. Strength in these areas allowed Quantum, Seagate, and Western Digital to post solid revenue growth (year-to-year and quarter-to-quarter). Though not in this pack, Maxtor and Micropolis by CYQ4 nonetheless managed to reverse previously disappointing revenue trends.

Margins, although improved both sequentially and year-to-year, remain modest when compared to other technology sectors. Competition is fierce in

## Revenue, Net Income, and Pretax Income Summary for 1994 and 1993

| | Revenue ($M) | | | Net Income ($M) | | | Pretax Income ($M) | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1994 | 1993 | % Change | 1994 | 1993 | % Change | 1994 | 1993 | % Change |
| Systems vendors | 132,052.4 | 123,352.6 | 7.1 | 3,791.8 | (7,439.0) | n/a | 7,385.5 | (7,078.7) | n/a |
| System vendors w/AT&T GIS (NCR) | 136,242.4 | 126,792.6 | 7.5 | n/a | n/a | n/a | n/a | n/a | n/a |
| System vendors w/o IBM | 68,000.4 | 60,636.6 | 12.1 | 770.8 | 662.0 | 16.4 | 2,230.5 | 1,718.3 | 29.8 |
| PC vendors | 29,351.8 | 22,604.9 | 29.8 | 1,528.9 | 421.4 | 262.8 | 2,220.6 | 595.3 | 273.0 |
| System vendors and PC manufacturers | 161,404.2 | 145,957.6 | 10.6 | 5,320.7 | (7,017.6) | n/a | 9,606.1 | (6,483.4) | n/a |
| Storage | 14,557.8 | 11,653.9 | 24.9 | 622.9 | (724.0) | n/a | 732.4 | (650.5) | n/a |
| LAN hardware | 6,598.2 | 4,756.3 | 38.7 | 608.7 | 595.1 | 2.3 | 1,077.3 | 944.1 | 14.1 |
| LANs w/software | 9,039.1 | 6,926.2 | 30.5 | 832.5 | 657.6 | 26.6 | 1,424.8 | 1,117.0 | 27.6 |
| Other data communications | 1,822.6 | 1,256.1 | 45.1 | 220.6 | 98.0 | 125.2 | 333.2 | 140.8 | 136.6 |
| Total communications | 8,420.8 | 6,012.4 | 40.1 | 829.3 | 693.1 | 19.7 | 1,410.5 | 1,084.9 | 30.0 |
| Multimedia | 1,191.6 | 591.5 | 101.4 | 54.7 | 17.6 | 210.8 | 79.0 | 27.7 | 185.3 |
| Telecommunications | 174,786.8 | 163,526.1 | 6.9 | 12,565.2 | (10,000.2) | n/a | 19,364.5 | 10,607.8 | 82.5 |
| Software | 24,360.7 | 20,525.6 | 18.7 | 2,656.1 | 1,373.6 | 93.4 | 4,250.5 | 3,228.6 | 31.6 |
| Application solutions | 6,469.5 | 5,840.6 | 10.8 | 199.4 | (540.8) | n/a | 367.1 | 132.1 | 177.8 |
| Application tools | 5,815.3 | 4,777.5 | 21.7 | 368.8 | 391.0 | -5.7 | 675.8 | 627.3 | 7.7 |
| System software and utilities | 12,075.9 | 9,907.6 | 21.9 | 2,087.9 | 1,523.4 | 37.1 | 3,207.6 | 2,469.2 | 29.9 |
| Software w/IBM software revenue | 35,706.7 | 31,478.6 | 13.4 | n/a | n/a | n/a | n/a | n/a | n/a |
| Services | 20,818.3 | 17,368.8 | 19.9 | 1,595.2 | 1,274.5 | 25.2 | 2,417.9 | 1,948.3 | 24.1 |
| Semiconductors | 53,811.0 | 41,731.6 | 28.9 | 6,004.9 | 4,582.3 | 31.0 | 9,137.6 | 6,814.6 | 34.1 |
| Total w/o semiconductors | 422,507.5 | 379,515.9 | 11.3 | 23,807.2 | (14,250.0) | n/a | 38,355.2 | 10,033.8 | 282.3 |
| Total w/o IBM | 412,266.5 | 358,531.5 | 15.0 | 26,791.2 | (1,566.7) | n/a | 42,337.8 | 25,645.5 | 65.1 |
| Total w/o semiconductors or telecom | 247,720.7 | 215,989.8 | 14.7 | 11,242.1 | (4,249.8) | n/a | 18,990.7 | (574.0) | n/a |
| Total w/o telecom | 301,531.7 | 257,721.4 | 17.0 | 17,247.0 | 332.5 | 5,086.9 | 28,128.3 | 6,240.6 | 350.7 |
| Total | $476,318.5 | $421,247.5 | 13.1% | $29,812.2 | ($9,667.7) | n/a | $47,492.8 | $16,848.5 | 181.9% |

*Source: International Data Corporation, 1995*

the storage market, and pricing is based on cost, not value. Size is also contributing to the downward pressure on margins. With the acquisition of Digital's storage businesses, Quantum joins Seagate in the exclusive $1 million-per-quarter revenue club. Companies of this magnitude can respond more quickly to periods of undersupply — a critical capability now that allocation is measured in weeks as opposed to months.

Component suppliers and tape companies fared somewhat better than hard-drive firms. Although still competitive markets, the component and tape segments are more fragmented, with concentrated market share and longer product cycles that allow suppliers to appreciate a payback. Thus, firms in these two segments escaped some of the fierce competition faced by their hard-drive brethren.

The Winchester drive market's revenues will expand a healthy 19% in 1995. A powerful combination of low-cost megabytes, a new operating system (Windows 95), and new processors will continue to drive volumes for both new PCs and the aftermarket.

The prognosis is positive for tape as well. Here, too, our optimism stems from a healthy and growing desktop opportunity. New competitively priced DC2000 capacity points will provide a substantial boost to industry volume over the next 12 months. Conner, Hewlett-Packard, and Iomega are all positioned to take advantage of this new wave of growth. Automation in the form of library products and autoloaders across various tape technologies will also favorably impact margins and revenues.

## Data Communications

As we enter 1995, datacom industry market segments are at widely variant stages of their respective life cycles. At one end of the spectrum, virtual LAN, ATM, frame relay, and LAN switching markets are expanding rapidly, and at the opposite end, segments including modems and network interface cards (NICs) continue to mature, offering more moderate growth and tighter margins.

Stratacom and Cascade Communications are representative of suppliers whose businesses based on emerging technologies have exploded. Their frame-relay solutions provide bandwidth-on-demand for bursty LAN traffic and cut transmission costs as compared to leased lines by allowing for multiple circuits to be consolidated into one. We expect strong demand for this technology to continue through 1995, especially from carriers, as demand for services drive continued infrastructure building. Although Stratacom and Cascade dominate this segment, niche vendors such as Newbridge Networks, in conjunction with local exchange carriers, are providing some competition. Cascade Communications has lowered prices, but competitive activity will not be defined by price alone; add-on features will also differentiate vendors in this young market.

The ethernet LAN switching segment, whose leaders include Cisco (with the acquisition of Kalpana and Catalyst), 3Com, Lannet, and Alantec, is also red hot. Emerging sectors like ATM and frame relay continue to attract a number of vendors, and as in most young markets, these vendors are jockeying for position. For example, Lannet established an equity stake in Hynet (an Israeli company with ATM technology), and Cisco purchased Lightstream for its ATM switching solutions, marking Cisco's third acquisition in the last quarter alone. Also of note, Chipcom's partner sales with IBM and its acquisition of David Systems boosted its revenues and port-shipment market share.

In 1995, the LAN switching market will experience increased segmentation, competition, and price pressure. The role of routers is being redefined as

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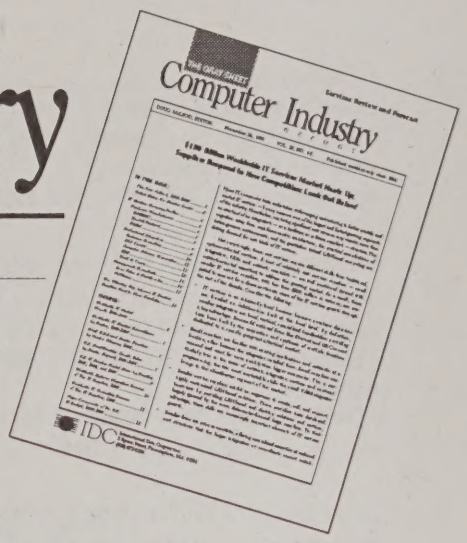


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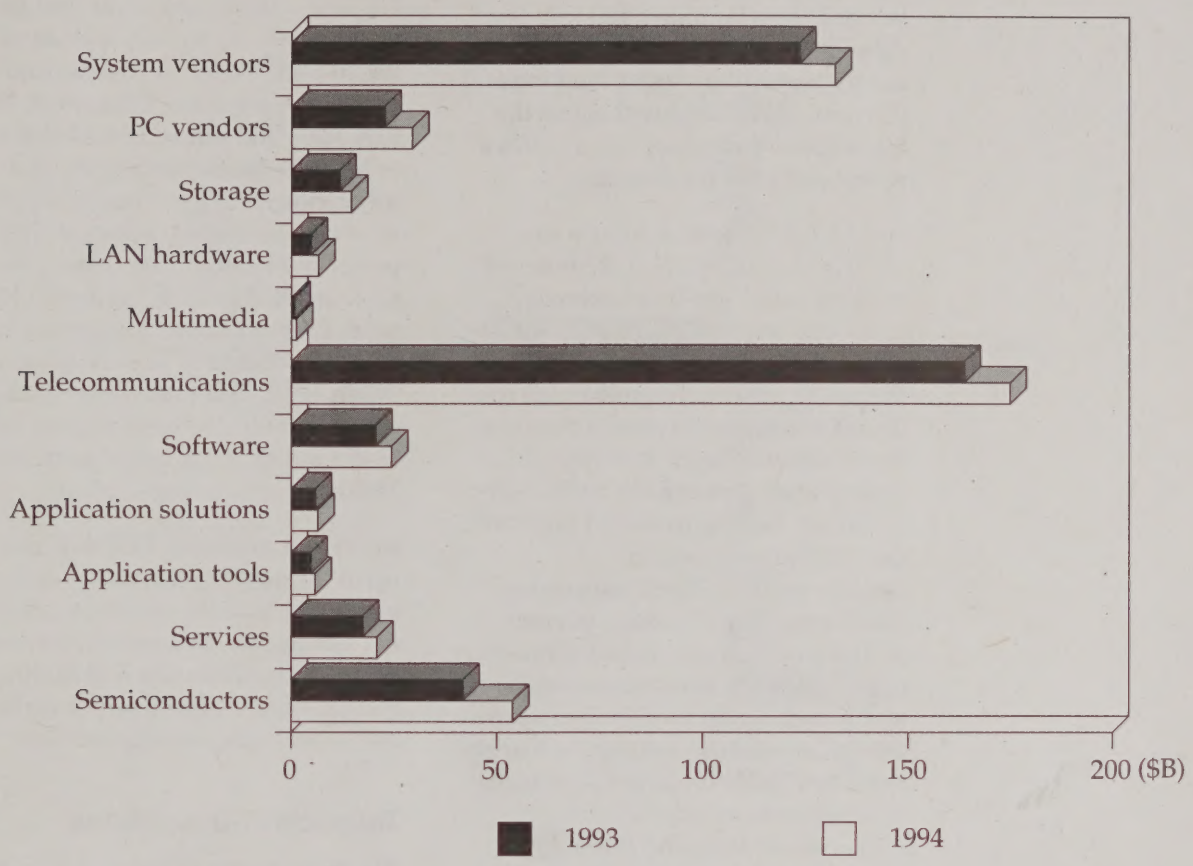
IT Revenues by Market Segment, 1993–1994




*Source: International Data Corporation, 1995*

LAN switching changes the microsegmentation paradigm. Ethernet switching will remain strong while token-ring switching heats up as Madge, IBM, NetVantage, 3Com, and Bay Networks improve availability and increase marketing.

With new areas attracting such attention, router and hub vendors are taking a back seat after a long reign at the top of the technology curve. Despite the absence of triple-digit growth, however, traditional router and hub vendors continue to grow at better-than-average market rates. In the hub arena, 3Com surpassed HP as the number one shipper of stackables in Q4. Nonetheless, both companies again gained port shipment share as stackable hub demand expanded. Chassis shipment growth was also strong, although less robust, as market leaders Cabletron and Bay Networks lost momentum. Cabletron's continued focus on the high end resulted in lower port volumes, but good revenue growth. Bay Networks' previous problems with high inventories, product positioning/transitioning issues, and merger distraction were mostly corrected during the quarter. The company's router sales grew strongly, while contribution from the SynOptics side was flat-to-up slightly.

Suppliers such as Cisco and Bay Networks are thriving off a large installed base and are focusing their attention on acquiring companies in hot new areas to keep up with the technology curve (as evidenced by Cisco's purchase of

Kalpana and Lightstream, as well as 3Com's acquisition of Nicecom). We expect ATM companies to continue to be hot targets for router and hub vendors in 1995. These mergers and technology acquisitions fuel a fundamental shift in LAN internetworking on the backbone and continue to make this a robust and growing segment.

Remote LAN access solutions saw a ramp in demand in 1994. Remote networking router revenues exceeded backbone revenues — a trend that is expected to continue through 1995. In the last 12 months, fragmentation continued to support a variety of remote-access solutions such as WAN optimization and dial-up ISDN. Market trends include increased proliferation of Internet access in small-to-medium-sized companies, development of telephony internetworking infrastructure, and connection of the corporate backbones to regional and branch sights. Despite a greater mix of low-end devices, router margins remained stable for larger players due to lower costs associated with economies of scale and lower chip costs. Second-tier players like Retix, Proteon, and Crosscom were not as lucky. Although the market will continue to support multiple suppliers, less diversified players will need to add businesses and invest in new technology to prosper.

Commoditization made "better-faster-cheaper" the theme of the modem market in 1994. PCMCIA experienced strong growth, and the move to V.34 compliance continued, but high-speed technologies could not escape price cuts of $50–100. As a result of stiff competition in 1994, US Robotics and Megahertz merged, Intel exited the market, and Hayes filed Chapter 11. Going forward, the modem market will continue to consolidate, leaving vendors with two viable options: merge or submit. Nonetheless, the market will be fueled by merger-related synergies, innovations (like ethernet/PCMCIA combo cards), and strong demand for V.34 and PCMCIA in 1995.

NIC sales also increased in 1994 fueled by strong PC shipments and lower pricing, especially on ethernet and token-ring solutions. Ethernet PCMCIA NICs and combo cards led to larger overall ethernet shipments, and token-ring NICs grew due to major vendors' declining token-ring adapter prices. Interestingly, this marks the first time that pricing has driven NIC sales. From a vendor perspective, there was little change in leadership as 3Com, SMC, and Intel continued to own 60% of the ethernet market, while IBM, Olicom, and Madge controlled 75% of the token-ring segment.

In 1995, upgrades to 100BaseT will pick up as increased connectivity and greater bandwidth constraints drive market growth. Meanwhile, ethernet price commoditization will continue, forcing vendors into internetworking and other higher-margin markets.

## Telecommunications

The final quarter of the year is traditionally the busiest for wireless telecommunication carriers, with some vendors booking over half of their new business for the entire year. As a result, fourth-quarter financial results set the tone for the type of year that these vendors should anticipate.

While cellular carriers continue to show large profits from their wireless operations, competitive pressures are starting to force pricing, and hence revenues and margins, downward. This trend will continue for the next few years and will accelerate when new, competing personal communications services (PCSs) are introduced in 1996.

Many of the larger cellular carriers entered into the FCC's auctions for the new PCS spectrum licenses. The first licenses are expected to be awarded at the beginning of the second quarter of 1995.

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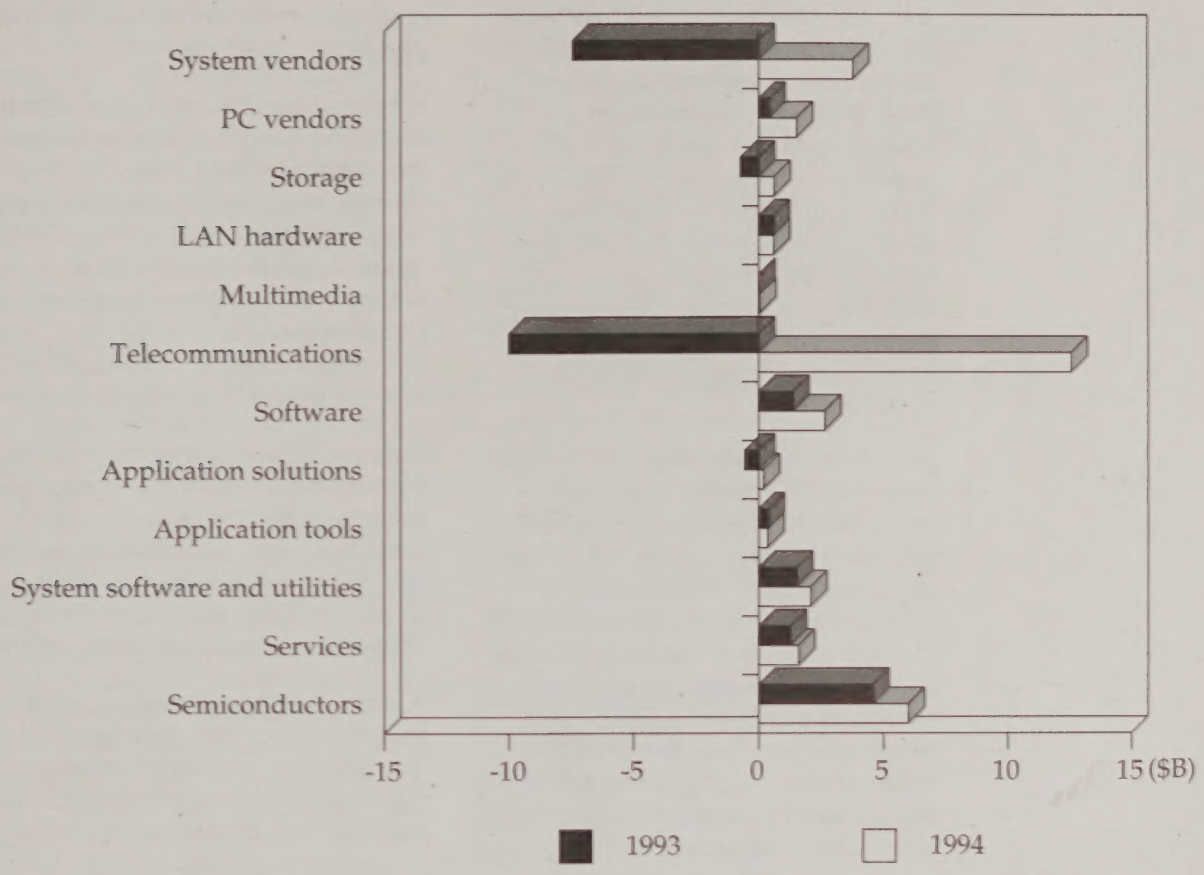
IT Net Income by Market Segment, 1993–1994




*Source: International Data Corporation, 1995*

The paging market continued to grow in 1994, but carriers did not enjoy the same margins as cellular operators. MTel, which has traditionally been profitable, posted a loss for the fourth quarter and for the year, despite expanding revenues. The company expects to report additional consolidated losses over the next two years as its long-range strategy to increase revenues 45% by 1996 requires further investment. MTel's plans include implementing competitive pricing for SkyTel paging services, continued investment in the expansion of its international network, and completion of the national wireless network, Destineer.

## Software

According to IDC estimates, the overall software market grew 11% in 1994. The application segment performed better than expected, and the system-level software and tool markets finished slightly under IDC estimates for the year. Looking to 1995, IDC anticipates worldwide software market growth to continue at approximately 12%. Consolidation among both large and small vendors will continue as vendors round out product offerings, and suites will remain the dominant "vehicle" for application sales, accounting for 50–60% of total word processing and spreadsheet volume.

The system-level software market grew approximately 8% over 1993 to a total of $224 million, falling slightly short of IDC expectations. Vendors that had a successful year were able to transition smoothly from mainframe product lines, maintaining revenue streams while investing resources into new products. Vendors such as BMC, Boole & Babbage, Computer Associates, Legent, Platinum, Compuware, and Sterling executed effectively and maintained margins in the face of pricing pressure. Overall margins in this segment experienced slight decreases from 1993.

IDC expects continued growth in this segment in the current year due to increasing demand for software that will better manage distributed operating environments. We anticipate a number of partnerships between monitoring vendors and tool vendors as the need to integrate performance monitoring and prediction products with development tools in distributed environments increases. Vendors delivering Internet-type applications are well positioned going into 1995.

The application-development-tool market remained healthy in 1994, growing 12.5% over 1993. Although the RDBMS market experienced the greatest growth, much of the action for the year focused around low-end information-access tools — resulting in price declines and revision of licensing policies for conventional vendors.

Vendors that cultivated partnerships fared well in 1994; others, such as Computer Associates and Sybase, grew their tool businesses by expanding their offerings through key acquisitions. Progress and Informix released second-generation 4GLs, and IDC expects both vendors to gain share in departmental and the medium-to-small firm segments.

Borland released Delphi '95, but continues to lose market share to Microsoft in C++ language environments. Microsoft's Access and Visual Basic gained some mindshare as information access tools, but the company still lacks credibility in the tool segment for complex large-scale applications.

Sybase's acquisition of Powersoft will ensure continued success for the combined entity. Sybase finished 1994 strongly by gaining in the downsizing and performance-management-application segment. Despite a strong market, the company's tool business has lagged. However, strategic acquisitions of tool technology like Powersoft will improve Sybase's performance in 1995.

Gupta struggled as it lost mindshare to Powersoft in 1994. By attempting to compete at the low end, Gupta is "Borlandizing" itself — competing on price and selling at prices that are too low. Gupta is looking to a new product release to brighten its outlook for 1995.

A strong revenue stream and rapid growth continued for Informix. Going forward, this company's investment in high-end technology will rival Oracle and keep it on a rapid growth track.

IDC believes that strong growth in the application-development-tool market will continue in 1995 at a rate of approximately 13%, driven by the continued strength of RDBMS and the maturation of 4GLs and other client/server tools. Several niche markets will emerge and grow rapidly in 1995, including data warehousing, testing tools, configuration management, and portable GUI builders.

The application and information-access segment experienced growth of approximately 12.5% overall for the year, with much of the growth attributable to client/server applications. Applications in vertical markets, particularly health care and finance, finished strongly for the year with services, facilities management, and outsourcing accounting for a growing percentage of vendors' total revenues.

PeopleSoft is now the seventh largest provider of client/server applications worldwide. IDC anticipates continued momentum for this company in 1995, specifically in human-resource-management applications as well as its recently released financial products. IMRS finished 1994 as the leader in the financial consolidation and reporting market and can look forward to a successful 1995 with the upcoming release of its client/server, transaction-oriented accounting suites.

Parametric Technology closed the year as the leader in the mechanical CAD/CAM software market. An increased international presence and a strong sales organization, as well as a new product introduction for the midrange market will ensure continued growth for Parametric in 1995. Autodesk released AutoCAD version 13 in November. An expanded product line, ramped-up sales and marketing efforts, and improved channels position Autodesk strongly for the upcoming year.

In light of a growing focus on customer service, IDC expects sales, marketing, and service functions, areas that have been traditionally "underautomated," to become a stronger focus for this sector over the next 12 months. Interest in vertical market programs will grow as will merger and consolidation activities among vendors seeking to expand industry coverage.

Microsoft's dominance of the Windows applications and office-suite markets continues. Meanwhile, other product activity on the desktop has been slow as many vendors await the release of Windows 95. The general release of Microsoft Windows 95 will be stalled until August 1995 with upgrade pricing in the $99 range. Windows 95 is expected to achieve a 60% penetration rate on new PC shipments in the second half of 1995, with a portion of early adopters upgrading within 90 days of its release (approximately 2.1 million upgrades). However, the migration of large corporations is not expected until early 1996. This implies a more dynamic market for PC applications later this year as end users begin another phase of technology investment.

Prices fell steadily throughout 1994 in the price-sensitive office-suite market. IDC anticipates prices will eventually stabilize between $400 and $425 in 1995. As might be expected, Microsoft commanded a dominant 82% of suite sales. The Novell/Borland suite merely hung in the game as shipments dropped 50% in 1994, from 100,000 to 50,000 units. IDC expects Novell to reverse this decline in 1995 because the large WordPerfect installed base is now ready to upgrade to an office suite. Vendor ability to build Windows 95 applications and offer workgroup-enabled and enterprise solutions will define success in this arena.

## Semiconductors/ Components

Semico Research, a partner of IDC specializing in semiconductors, notes that component sales continued to climb sequentially in the fourth quarter, driven by growth of the PC market and client/server architectures. Given worldwide semiconductor shipments surpassing $100 billion, it was difficult for any semiconductor company to report lower revenue in 4Q94 versus 4Q93. Some companies, however, took advantage of high profits for the year to write off potential losses. For example, Intel took a $475 million pretax charge to cover expenses related to the Pentium chip flaw. The magnitude of this write-off may be overstated because the inventory of the flawed Pentium can be sold with the floating-point unit disabled, and only about half of the bad chips are expected to be replaced.

Business picked up for AMD as its court battle with Intel finally came to an end. Besides the fact that Intel and AMD were spending millions on attorneys, Intel was motivated to end the dispute because it expects to cause the

486 to become obsolete with aggressive pricing on the Pentium chip in 1995. For the short term, AMD will benefit: 486 orders from clone manufacturers have increased since the settlement. Intel's competitors should expect to see aggressive pricing from the chip giant as it attempts to convert the PC market to Pentium via price pressure. Intel understands that the street price of complete systems determines unit shipments and will price the Pentium to ensure volume. We expect to see at least a 60% decline in Pentium pricing during 1995 as compared to 1994.

The micro logic market concluded 1994 on an upswing. Revenue for this product group jumped 10% to $6.6 billion in the fourth quarter as compared to the third quarter of 1994. Driven by strong PC demand, micro logic ICs will continue to serve a swiftly expanding market in 1995.

Supply for 4-megabit and 16-megabit DRAMs remains constrained. Both Micron and TI benefited from expanding memory demand given their increased manufacturing capacity. Manufacturing expansion that began in 1993 and was finally brought on line in 1994 contributed to fourth-quarter profits. TI's partnership with Acer, designed to increase DRAM capacity, also profited both parties. Micron and TI are well positioned to supply the new higher-speed EDO (extended data out) DRAM. This is significant as EDO memory will help PC OEMs move Pentium down the price curve since it obviates the requirement for a costly external cache.

Speaking of external cache, the SRAM market for Pentium-based PC secondary cache helped IDT to achieve record sales and profits. IDT was limited only by capacity for the amount of SRAM it could ship. Motorola has also experienced strong orders for SRAMs in early 1995, and as a result SRAMs will remain on allocation for at least the first half of the year. This industry-wide phenomenon will continue through the first half of 1995.

## Services

Service providers that have been struggling to make a transition from government to commercial contracts over the past few years found the 1994 market to be very accommodating. Commercial demand, particularly from the financial services and communications sectors, provided a significant boost to the professional services market over the past year, benefiting specialists such as First Financial Management and Fiserv. Both companies reported revenue growth of approximately 25% for the year. In addition, Andersen Consulting's Financial Services and Communications practices grew 36% and 52%, respectively.

Greater IT service demand from financial and communications companies signals a reaction to the competitive environment in the commercial market that requires companies to develop an ability to do the following:

- Customize service and product packages according to individual customers' needs
- Control high-volume workflow while managing intricate and vast databases
- Shorten product delivery time significantly

As these requirements heighten the need for integrated IT solutions, new service specialists, as well as systems and software vendors, are increasingly converging on the high-growth, high-opportunity services market. Yet the success of both existing service suppliers and new market entrants indicates the market is far from becoming oversaturated. IBM's service revenues expanded 25% in 1994, and Groupe Bull finally rebounded from a five-year sales downturn primarily due to a 12% increase in maintenance service revenues. A wide variety of service activities — including consulting, implementation, maintenance, training, and outsourcing — created plenty of opportunity for niche players to emerge.

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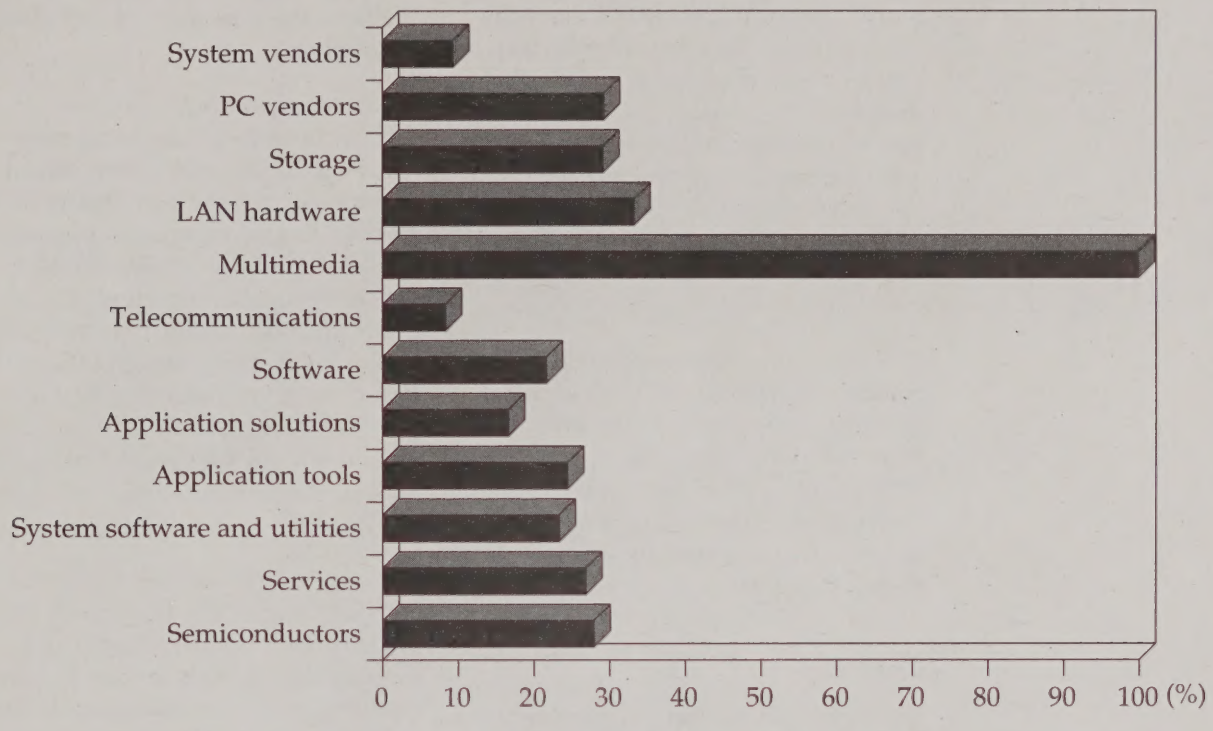
Percent Change in Revenues by IT Market Segment, 1993–1994




Note: These are raw percentage changes that do not account for the relative size of segments. Thus, although multimedia is the most rapidly growing market, it is dwarfed in size by segments like telecommunications.

*Source: International Data Corporation, 1995*

Despite the market's ability to support additional entrants, traditional IT professional service specialists such as EDS, CSC, and CACI International are aggressively protecting their market share through acquisitions. As a result, revenue growth of the service-focused companies in our database outpaced the overall market, climbing 20% in 1994. The momentum carried through to the end of the year as fourth-quarter revenues rose 27% over the year-ago period. Revenue growth will remain well into the double digits in 1995 as commercial sector demand is sustained.

Although net income jumped 25%, improving margins were limited mainly to vendors, including ADP, American Management Systems, and Computer Horizons, which focused on expanding revenues from their existing operations. In contrast, the larger, acquisition-minded service vendors, such as CSC, EDS, First Financial Management, and Keane, found their usually consistent margins getting squeezed. Despite having an ability to manipulate flexible cost structures, these vendors are finding the high costs of acquisition beginning to take a toll.

The margins of larger vendors can be expected to dip slightly due to the following:

- A greater willingness to take on a higher volume of outsourcing contracts, where greater competition pressures margins
- The expense of a growing corporate infrastructure to support its organizational expansion
- The costs of ramping newly acquired consulting operations

If these vendors continue to pursue growth through acquisitions, their ability to maintain margins will be tested more severely in 1995. EDS has already opted to target staff reductions to help prevent any further deterioration of its margins. The company has demonstrated it can manage both its big contracts and its expanding operations; nevertheless, other aggressive vendors may risk creating unmanageable beasts with runaway costs and inefficient organizational structures.

EDS views new market entrant AT&T Solutions as a threat, but there is plenty of business out there for everyone. However, don't expect acquisition activity to subside in 1995. The lure of a swift organizational expansion will be too great for large vendors seeking to protect their turfs.

## Outlook

The positive IT market environment is expected to last at least through 1995. As solid economic growth filters through most world regions, expanded IT applications in the commercial sector will sustain market demand for all major IT segments. End-user requirements for flexibility and speed, as well as greater price/performance, will maintain the popularity of client/server solutions.

It will be interesting to observe, though, how the IT vendor convergence on the expanding commercial market will reshape the industry in 1995. Will vendors separate into niche markets? Will new entrants to the market claim significant ground? Can major players continue to consolidate their market share through acquisitions without endangering their margins in the long term? Can these large vendors successfully meet the needs of existing customers and move into new markets?

Although current market conditions suggest a stabilization of growth rates and a balance between supply and demand, one thing is certain: market equilibrium is never sustained. In the meantime, fertile ground promises another bountiful season that should satiate most appetites once again in 1995.

THE GRAY SHEET
# Computer Industry REPORT

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# The Information Highway — Will You Surf It or Get Pummeled into the Sand?

The Internet — it's everywhere: nightly broadcasts, capitol hill, your daily paper, and the popular news weeklies.

But what's the real (i.e., sans hype) impact of the Internet on IT suppliers today? It is twofold. Business opportunity today and wholly new business paradigms tomorrow. Consider the following:

- An Israeli software company releases a $50 software package to mediate no-cost long-distance telephone calls over the Internet. This means opportunity today, a real long-term threat to the established telecommunication industry.
- Software vendors make new-release updates available to existing customers over the Internet — helping customers today, a long-term alternative to today's software distribution channels.
- Cornell University releases free videoconferencing software — an immediate solution for academic researchers, a long-term alternative to specialized videoconferencing suppliers.
- Dozens of companies (E-cash, Microsoft, NetBill, etc.) race to design the structure of electronic commerce on the net. Their goal is to become the MasterCards, Visas, and transaction clearing houses of the Internet era. Again, revenue today, new model tomorrow.

The Internet represents the most fundamental shift in business practices since the onset of widespread

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use of credit cards in the 1960s. It has begun to alter the face of commerce radically and reorient the celestial axes by which IT suppliers have traditionally charted their course. In fact, the surfing metaphor is apt; some IT companies will ride the Information Highway wave to profitable new business opportunities, while others will miss the wave and be pummeled into the sand.

How can IT suppliers ride the Infohighway? They need to first understand the flat-earth, round-earth transformation under way. This issue of *The Gray Sheet* analyzes the implications of the great convergence.

## The Next Wave

As previously discussed here (see "The I-Way Is No Byway," *The Gray Sheet*, Volume 29, No. 23, 10/28/94), the Information Highway is the next stage in the evolution of the information technology industry. The first stage was based on proprietary minicomputers and mainframes, which were focused on institutions and involved a relatively limited number of information workers — around 10 million worldwide. Peaking in the early 1980s, this first stage has since fallen into a gradual decline; terminal connections should dwindle to inconsequence in about a decade and a half.

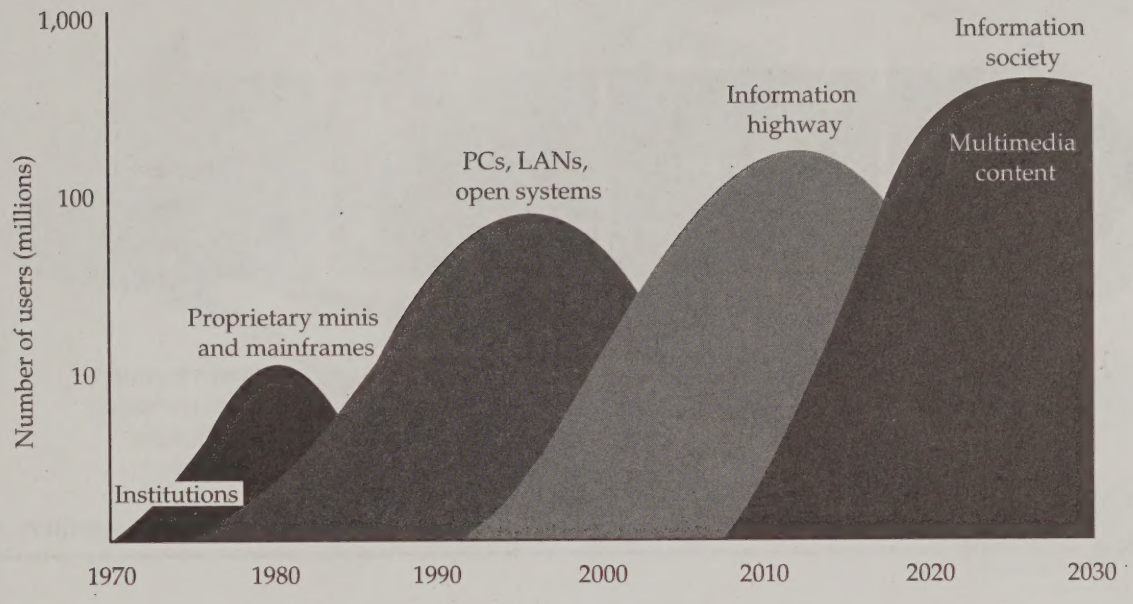
We are currently at the apex of the second stage, centered on individuals (nearly 100 million of them), whether in the workplace or the home. The technological center is the personal computer or workstation, either standalone or on a LAN. In a broader sense, this stage has encompassed the entire open-system revolution, which helped shift the economic center of the industry from the hardware manufacturer to the software purchaser — from "the box" to the software that runs on it.

The I-Way is the next great wave of industry expansion and is defined by the pervasive connectivity of both business and consumers. In this stage, everybody gets connected to everybody: businesses get connected to other businesses — both customers and suppliers — consumers get connected to one another and to businesses, and so on. For evidence that this wave is upon us, one need look no further than the explosion in connections to the Internet, the first major manifestation of universal interconnection.

Beyond the I-Way lies the information society, which will be defined by the arrival of truly all-digital multimedia content. The transition to this fourth stage will be as significant as that to the earlier sequences. The difference will be equivalent to the jump from client/server to "wired." Ironically, as we move into the information society stage, the I-Way will disappear. Going forward, the technology of the Information Highway will be no more a part of everyday life than the electric power grid. In this sense, ten years from now to name a magazine *Wired* might sound as odd as naming a magazine *Dial-Tone*.

Volume 30, Number 9

Stages of Industry Growth




*Source: International Data Corporation, 1995*

## The Information Highway — A Value Chain of Opportunities

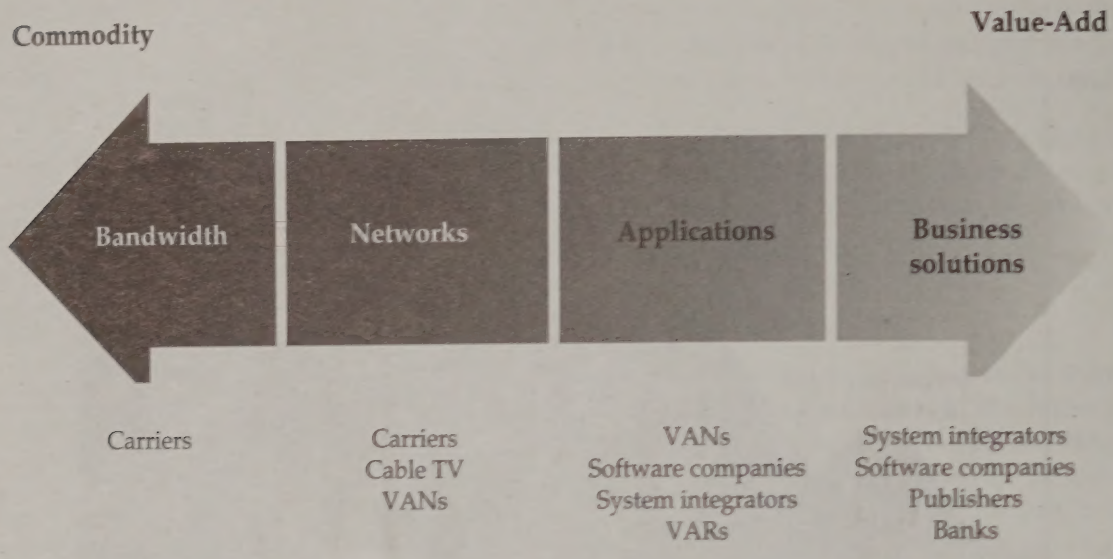
The I-Way will drive growth across the entire IT value chain. At the commodity end of the spectrum, carriers will simply sell bandwidth. Moving toward value-added products and services, the I-Way will drive a host of opportunities. Carriers and cable TV companies will provide networks, software companies and value-added resellers will sell applications, and VARs and publishers will offer business solutions. Where a company positions itself along this spectrum will also determine the amount of competition it can expect. At the commodity end of the value chain, a very small number of large companies will be bandwidth providers.

Meanwhile, at the value-add end of the continuum, a multitude of vendors will offer specific, vertically oriented solutions (like publishers and banks).

## Internet vs. Information Highway

The Internet is the current implementation of the Information Highway (I-Way). Whether or not the Internet becomes what we someday consider the I-Way, the I-Way will mirror the Internet's shared and distributed nature. Under this model, each company pays only for its connection to the network, not the network itself. This change in infrastructure is significant. Currently, individual connections are required for different types of con-

Market Drivers: Supply-Side Opportunities in the Value Chain




*Source: International Data Corporation, 1995*

tent. For example, telephone companies have a network that provides information to telephones and PCs, while TV broadcasters have a separate network that services televisions. Firms in these industries are already blurring the distinction between their networks — cable companies are providing phone service, phone companies are delivering TV programming — but this is only the beginning. The I-Way will be a shared highway serving multiple devices and providing a broadcast medium for many businesses.

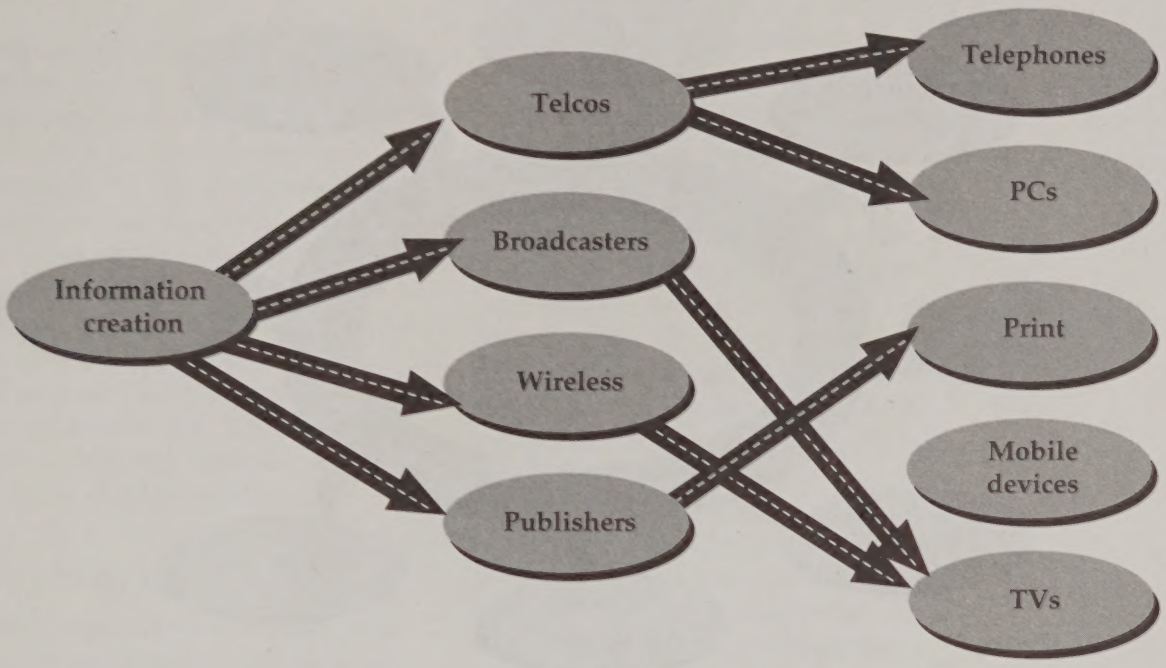
As the current implementation of the Information Highway, the Internet offers many IT companies opportunities to make money and/or save money. For example, how much money would Dell Computer save if customers could enter their own orders using a World Wide Web form? PC buyers savvy enough to know how to do this are not only likely to buy lots of (and/or expensive) systems, but they probably know exactly what they want and find the typical 1-800 sales rep a barrier rather than an aid.

The I-Way, on the other hand, represents a longer-term challenge for firms in the IT market. Although the I-Way offers vast promise, the convergence of markets it will engender also are a formidable threat.

## Convergence

As the shared nature of the Information Highway suggests, the I-Way represents a potential paradigm shift for several IT markets. Consider VocalTec's Internet Phone software, which allows one to make a phone call over the Internet using a multimedia PC. Even a high-speed 14.4Kbps modem connection is sufficient for this software to work, providing a half-duplex (only one person can speak at one time), two-way voice connection with another person

Migration to New Infrastructure Model, Traditional View




Source: International Data Corporation, 1995

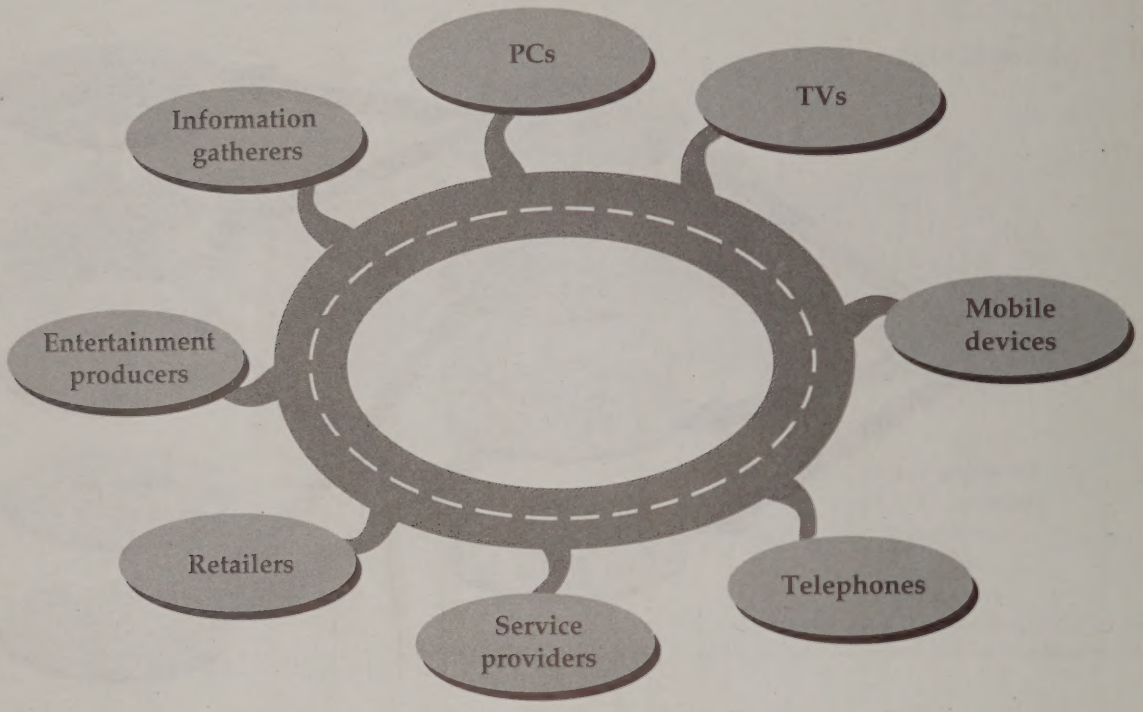
using a similarly equipped PC. Given a local access number for one's Internet connection, such a "phone call" entails no long-distance charges; it makes no difference if the call is to someone next door or on the other side of the planet. If AT&T's greatest strength is its telephone network, what are the implications of technological advances like VocalTec's software? A paradigm shift, plain and simple.

Technological shifts along the lines of Internet Phone change the rules of a market such that existing strengths are no longer relevant; the playing field is leveled and everyone starts from scratch. As a result, the I-Way represents a double-edged sword. On the one hand, the Information Highway offers savvy IT vendors new and exciting market opportunities. On the other hand, IT vendors who ignore the I-Way could be put out of business. Thus, it isn't enough for IT vendors to merely investigate how the I-Way may affect their businesses in a passive fashion. Instead, firms should actively assess its impact and attempt to put themselves out of business. If they don't, someone else might.

## The I-Way: Now

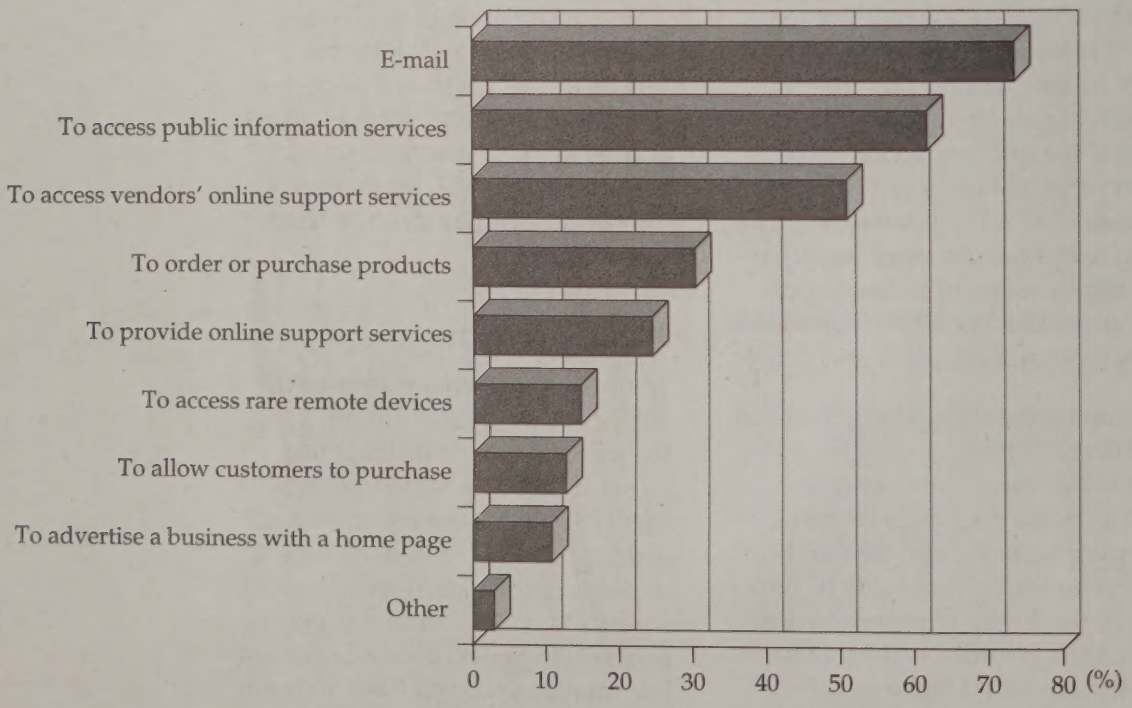
To understand what purposes the I-Way will serve, it is enlightening to examine current Internet use. According to IDC's *1995 Telecom Manager Survey*, the top three Internet applications are e-mail, access to public information services, and access to vendors' online support services. In general, messaging and information retrieval have accounted for most current Internet use; activities related to customer support were viewed as near-term

Cost Sharing of Network Assets




*Source: International Data Corporation, 1995*

Intercorporate Internet — Applications in Use Currently




*Source: IDC's* Telecom Manager's Survey, *1995*

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applications; and electronic commerce was perceived as a future application.

Although these results are not surprising, they do serve to confirm that most Internet use is for basic stuff. As a result, any near-term focused and Internet-related business strategies should keep this bread-and-butter Internet use in mind — the fancier stuff is a few years away. (Telecom managers, by the way, also intend to use the Internet primarily as an intercompany internetwork. It will not replace existing corporate networks or public data networks.)

## The I-Way: Later

Nonetheless, the rate at which new Internet applications are being created and the speed with which the Internet is growing are encouraging. Recent and exciting applications for Internet use include VocalTec's Internet Phone software and Cornell University's CU-SeeMe videoconferencing software (ftp to "ftp://gated.cornell.edu/pub/video/"). Not only are these applications very real examples of convergence enabled by the I-way, they are indications of next-generation I-way market opportunities. On their own, such advancements are impressive. In conjunction with the explosion of Internet adoption, however, these new technologies signal enticing business opportunities.

## Security

For the Internet to be a viable place to do business it must become more secure so that transactions are reasonably safe and can confidently transpire. This is not, however, a hurdle that will be cleared once, never to be dealt with again. Instead, security on the Internet will be an ongoing challenge, a dynamic relationship. As more ingenious methods of enforcing security are discovered, so will increasingly clever ways to foil such measures be found.

In this sense, Internet security is much like physical security in the real world. People are comfortable putting their money in banks because they feel it is safe and, perhaps more important, because they know it is insured. Insurance companies are comfortable insuring banks because they are assured security measures are sufficient to thwart attempted robberies. Bank robberies do occur, however. Insurance companies simply have determined that the chance of a successful robbery occurring is so unlikely that it is an acceptable risk.

With this comparison in mind, people are concerned about security on the Internet for two reasons. The first is that, in general, people feel that the risk is too high — there isn't sufficient security. In other words, at the moment, Internet security is out of synch with physical security in the real world. The second reason has to do with computerized information's efficient and organized nature. Because electronic information can be erased, changed, and/or copied extremely efficiently, once a computer system has been broken into, it can be seriously damaged.

## PS — We've Caught the Fever, Too!

Even the esteemed *Gray Sheet* has caught Internet fever. Although it's too early to offer any juicy details, you can expect to find *The Gray Sheet* on the Internet, too. Primarily, our Web site will be for marketing purposes (whose isn't?), but we are thinking of offering periodic tidbits unique to *The Gray Sheet* — online. Stay tuned, and save us a space on your Web browser's hot list.

## Sink or Surf

Whether contemplating I-Way–related activities or attempting to assess the impact of the I-Way on their businesses, IT vendors should actively and aggressively investigate I-Way threats and opportunities. After all, the I-Way heralds both the next great wave of IT market evolution and a converging of markets. Short-term and mid-term opportunities open new markets for companies immediately, and they portend major long-term shifts and new business models as well. In short, even if you can't make money on the I-way today, you'd better prepare for tomorrow.

For some firms, separate divisions, skunk works, or even businesses may be appropriate because the I-Way's implications may be politically and culturally too controversial to fully explore internally. Paradigm shifts like those that will be created by the I-Way are difficult enough to spot in one's own industry, let alone address with existing staff and resources. As a result, new staff that is not encumbered by the organization's existing culture may be required. Otherwise, any I-Way effort may be blinded by the company's current vision and/or hamstrung by the firm's existing hierarchy.

As firms actually prepare I-Way–related efforts, they should consider where their product or service falls on the I-Way value chain. One's place on this continuum will not only reaffirm the commodity vs. value-add nature of the product, but the amount and level of competition it will face.

Finally, a firm needs to think about current Internet use and how it relates to its product or service. Despite exciting emerging applications, the bulk of today's Internet use is for bread-and-butter messaging and information-retrieval activities. More sophisticated I-Way applications are undoubtedly coming, but their widespread use is further off than most of us think.

This is not to say that IT vendors shouldn't be preparing for these next-generation I-way opportunities; as previously stated, they absolutely should. Rather, firms should conservatively temper their expectations for the timing of a return on this investment. Would IBM's original PC have been as successful if Don Estridge's group had been on a tight leash with huge and short-term profit expectations? Whereas some markets offer opportunity for short-term revenues, in all there is a much more serious long-term convergence challenge the investigation of which should be viewed as an investment. As IT markets collide on the Information Superhighway, some fatalities are sure to occur.

THE GRAY SHEET
# Computer Industry REPORT

Published continuously since 196

# Home Is Where the PCs Are: The Home Computing Market Comes of Age

INTERNATIONAL DATA CORP.
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The cat is out of the bag. The home computing market has emerged as perhaps the strongest driver of growth in the IT market. Not only does the home PC market's strength have implications for segments of the IT market as we know them today, but in the future it will spawn entirely new and potentially massive opportunities. (In fact, these new products and services will serve as fertile ground not only for IT vendors but for just about any other business as well.) Consider the following:

- PCs are in more U.S. homes than camcorders or mobile phones and in nearly as many as video games.
- Trade associations claim consumers bought more PCs than televisions in calendar 4Q94.
- Of 1994 U.S. PC unit shipments, consumer PCs accounted for 41% while small, medium, and large business comprised 47%.
- Home users are the new "power users." Consumers are now buying more advanced and more expensive PCs than businesses.

In order to capitalize on the consumer PC boom, IT firms first need to understand the consumer market. How big is the home PC market now and how fast will it grow? What types of PCs are users buying and how are they using them? What impact does geography have on the answers to these questions? Who is currently successful at selling PCs

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into the home and why? IDC addressed these issues with a ground-breaking survey of consumers worldwide. The *Global Home Market Survey* is based on 7,000 in-depth interviews with consumers in the United States, Western Europe, and Japan. More specifically, the survey consists of three different questionnaires: one for households with PCs, one for households without PCs but considering purchasing one, and one for households without PCs and not considering buying one. The questionnaires were used in November–December 1994 to conduct 1,000 interviews in seven countries: the United States, Japan, Germany, France, the United Kingdom, Denmark, and Benelux.

## U.S. Market Most Advanced

By virtually any measure, the rapidly growing home personal computer market in the United States is considerably more developed than in Japan and major countries of Europe. Not only do a much higher percentage of U.S. homes have personal computers, but the use of emerging consumer applications such as education, entertainment, and online services is considerably more developed in the United States. This latter point is significant as it indicates that demand in the United States for computing goods and services has matured beyond basic hardware and software and is starting to drive growth in other areas including communications (online services and video conferencing and thus phone connections and ISDN) and entertainment (CD-ROM titles, online services). In this sense, the PC may prove to be like TV in how it drives a host of related markets (VCRs, camcorders, entertainment systems, cable, etc.).

The more advanced use of PCs in the United States also indicates that the U.S. home computing market is no longer simply driven by a desire to do work at home. Indeed the home PC market has come of age; it is a distinct market with unique needs and requirements. For IT vendors, this development signals dramatic and near-term worldwide opportunities for basic computer hardware and software. In addition, as computers penetrate the home, their use will spawn impressive opportunities in many related markets, opportunities that are starting to appear in the United States.

Though significant in size, the worldwide home computing market is more important for the opportunity it holds tomorrow than for its reality today. In 1994, homes accounted for just 6% (up from roughly 5% in 1993), or $25.8 billion, of the $430 billion spent worldwide on IT.

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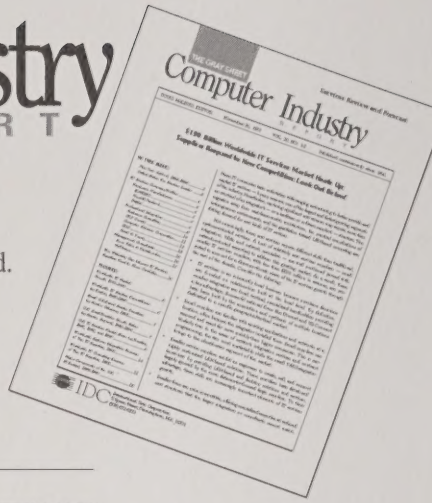


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Of the countries surveyed, the United States had the highest percentage of respondents indicating they had one or more personal computers in the home at 37%, a sign of the market's relative maturity. Tied for second place were Benelux and Denmark with 30%, followed by Germany with 28%. Of those without PCs, 9–11% of respondents in most countries were considering buying one. Outside the United States, a full 57–63% of those surveyed who did not have a PC had no plans to get one. Even in the United States, 49% of homes without PCs had no intention to buy.

PC vendors' first challenge is to clinch the fence sitters, the 9–11% who are thinking of buying a PC. In order for the home market to blossom, however, the mass of homes with no plans to purchase must be converted. After all, if all homes considering a PC decide to buy, less than 50% of homes worldwide will have computers. As a comparison, according to our survey a VCR is installed in 88%, 87%, 70%, and 60% of homes in the United States, the United Kingdom, France, and Germany, respectively. Closest to, although slightly above, the PC in terms of home penetration are video games, which ranged from 13% in Germany to 40% in the United States.

Penetration rates are important because only when they are high will the home computing market gain attention from firms whose participation is required to enable next-generation products.

PC Usage Status by Country, 1994 (%)

| | With now | Considering | No plans |
|---|---|---|---|
| U.S. | 37 | 10 | 49 |
| Benelux | 30 | 6 | 61 |
| Denmark | 30 | 11 | 57 |
| Germany | 28 | 9 | 61 |
| U.K. | 24 | 11 | 63 |
| France | 15 | 12 | 61 |

*Source: International Data Corporation, 1995*

Percentage of Households with Key Consumer Technologies (%)

| | U.S. | U.K. | France | Germany |
|---|---|---|---|---|
| VCR | 88 | 87 | 70 | 60 |
| CATV | 67 | 7 | 10 | 50 |
| Video game | 40 | 28 | 26 | 13 |
| **PC** | **37** | **24** | **15** | **28** |
| Mobile phone | 24 | 12 | 5 | 5 |
| Fax | 8 | 5 | 5 | 5 |

*Source: International Data Corporation, 1994*

Even under our conservative forecast, IDC expects that 50% of homes in the United States will have a PC in the year 2000. In fact, should conditions prove favorable, as many as 70% of U.S. homes could have a PC by 2000. Not only will there be more PCs in homes, but the home portion of the total IT market from a dollar perspective will expand. Under our moderate forecast the worldwide home market will more than triple by 2000, growing from $24 billion (or 6% of the total IT market) in 1994 to a whopping $85 billion (or 14%) in 2000.

Worldwide Home Market Forecast Scenario

| | 1994 | 2000 | CAGR (%) |
|---|---|---|---|
| U.S. home market size ($B) | 13 | 30 | 15 |
| U.S. share of worldwide home market (%) | 55 | 35 | |
| Worldwide home market size ($B) | 24 | 85 | 23 |
| Home market share of total IT market (%) | 6 | 14 | |

*Source: International Data Corporation, 1994*

## What Do Home PCs Look Like?

According to our survey, in the United States most IBM-compatible home PCs have a color monitor (73%), run Windows (63%), and are attached to a printer (89%). Many of these PCs are a 486 or higher (31%), have a modem (46%), and have a CD-ROM drive (22%). According to weighted averages, home PCs in Europe (Germany, France, the United Kingdom, Denmark, and Benelux) are similarly configured, except fewer have modems (13%) or CD-ROM drives (14%).

These figures have serious implications with regard to how a vendor's product or service will be received by the installed base of PC users. For example, despite the current hype over CD-ROM, far from the majority of current PCs have drives. On the other hand, IT firms should keep in mind that home PC consumers have recently shown themselves to be cutting edge, rapidly endorsing new technology. In fact, recent history indicates that if home users perceive a given technology offers them compelling benefits, they will likely be the first to endorse it. For instance, IDC expects that by the end of 1995 MPEG video acceleration (which provides full-screen, full-motion video), a feature that previously was largely restricted to vertical business markets, will start to become a standard home PC feature long before it is similarly endorsed for business desktops. Today's basic home PC is a 486DX2 or above and includes a double- or quadruple-speed CD-ROM drive, a 9600bps or faster fax/modem, a sound board, and speakers.

### Compaq
**(6,000 retail locations)**

**Market share:** 15.0% (of the 7.6 million consumer PCs shipped in the United States in 1994)

**Strengths:** innovative quality products, strong brand name, efficient manufacture and distribution procedures

**Weaknesses:** need more frequent product refreshes as home users want the latest technology

### Packard Bell
**(11,000 retail locations)**

**Market share:** 20.0% (of the 7.6 million consumer PCs shipped in the United States in 1994)

**Strengths:** frequently a feature-set and price leader, understands channel better than most, effectively uses co-op and other reseller incentives to get shelf and advertising space

**Weaknesses:** poor brand recognition/loyalty (given size), facing increased competition from heavy hitters with deep pockets (Digital and HP), retailers fear overreliance on single vendor

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## How Are Home PCs Used?

Home PCs are used similarly in the United States and in Europe. Our survey showed that the typical home PC was used 13 hours per week in the United States and 11 in Europe, 80% of that time by an adult in the U.S. market (89% in Europe). Home PC users in both the United States and Europe also reported using a modem for four hours a week, and U.S. respondents indicated they printed 28 pages per week while European respondents said 31.

When asked to rate the importance of key applications, survey respondents ranked "job work" and "education" the highest. "Job work" was rated highest by those with PCs and those without and not considering, but was rated number two (behind "education") by respondents without a PC but considering buying one. Households without a PC and not considering one rated "education" second in importance.

These results indicate that although job work has been, and continues to be, a key motivator of home PC purchases, education is emerging as perhaps an even more powerful factor. After all, today's home PCs are multimedia enabled, not a requirement for most job work but virtually mandatory for existing educational titles. This shift in focus from job work to education signals the maturation of the home computing market beyond one merely spun off of the work environment. Rather, computers (especially in the United States) have become part of families' lifestyles, fulfilling many roles for different family members. As a result, as with many other consumer markets, PC marketers are well advised to consider children in their marketing activities. Most firms have figured out that children should be included in marketing material that is targeted at parents, but few (if any) have marketed to kids directly. (A tip of the hat goes to Compaq, though, for its "role" in the "..Carmen San Diego.." cartoon.)

### AST
**(6,500–7,500 retail locations; roughly 50% are Radio Shack)**

**Market share:** 4.0% (of the 7.6 million consumer PCs shipped in the United States in 1994)

**Strengths:** innovative offerings, perceived as solid "other" vendor, good margins especially at the low end

**Weaknesses:** poor brand recognition, not effectively differentiated — perceived as "other" vendor, not top choice

### Acer
**(roughly 1,200 retail locations)**

**Market share:** N/A

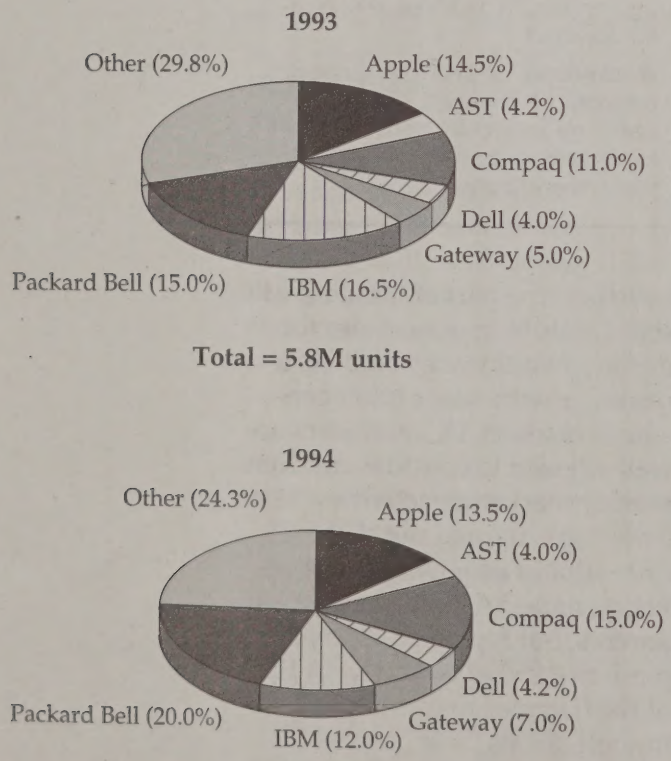
**Strengths:** savvy player, has capitalized on other's mistakes, strong at the low end

**Weaknesses:** Limited retail presence (roughly 1,200 stores), not on channel/consumer short lists, relegated to filling in the gaps, weak brand name

## Who Is Good at Selling PCs into the Home? The User Perspective

To get a sense for the home computing market's impression of which PC vendors are doing well at selling into the home, we surveyed the installed base (2,800 homes) and those homes planning to buy in 1995 (1,150 homes). In both categories, Apple topped the rankings followed by IBM and Compaq. In terms of installed base market shares, Packard Bell and Tandy followed (in that order), while Hewlett-Packard and Gateway 2000 took fourth and fifth place among homes planning to purchase.

U.S. Consumer PC Shipments, Major Vendor Market Share, 1993 and 1994




*Source: International Data Corporation, 1994*

## Who Is Good at Selling PCs into the Home? The Market Reality

In reality, Packard Bell clinched the top spot in U.S. consumer PC shipments in 1994 by capturing 20.0% of the total 7.6 million units. The top five positions were rounded out by Compaq (15.0%), Apple (13.5%), IBM (12.0%), and Gateway 2000 (7.0%).

Among other things, these results indicate that brand equity takes time to develop; it does not immediately follow market performance. For example, although Compaq is the number one PC vendor, its market share in our survey fell significantly below Apple and IBM and tied Packard Bell in the installed base. Speaking of Packard Bell, even though our survey was concerned with home PCs, and Packard Bell is currently the number one supplier, it ranked fourth in the installed base and only sixth among survey respondents planning to buy.

The latter ranking hints at what is perhaps Packard Bell's greatest challenge: sustaining its current position. Although Packard Bell currently reigns in retail, if consumers who plan to buy a PC rank the company only sixth, its position is tenuous. To its credit, it has clearly done an admirable job getting buyers to ultimately choose Packard Bell. However, it has failed to achieve the kind of brand equity that could elevate the company beyond low-price-leader status, carry it through any

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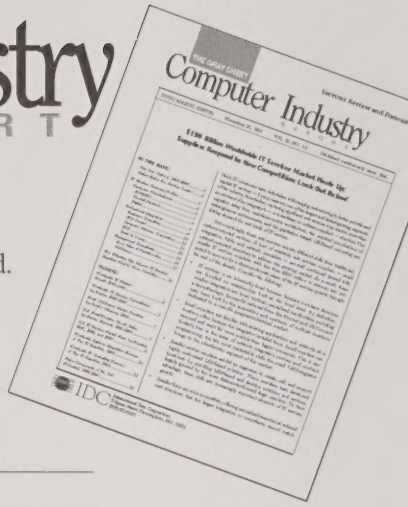


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soft spots, and ultimately sustain it over the long haul. If Packard Bell's love affair with retail should come to an end before such equity is achieved, its stint at the top may look more like a one-night stand than a lifelong commitment.

The survey and market results also indicate that the retail channel, while important, is not the only path into the home. The most critical short-term segment, homes planning to buy a PC, rated Hewlett-Packard and Gateway 2000 — vendors without a retail presence — in the top five (above Packard Bell). In fact, at the time of the survey HP didn't even have a consumer PC line (HP currently is quietly testing some home PCs in Circuit City, and a more complete rollout will follow later this year). Meanwhile, Gateway 2000 sells direct exclusively.

## Vibrant Home PC Opportunity

Finally, the user survey shares, and to a lesser extent the real market share data, suggest that vendors have ample opportunity to improve their position in the consumer PC market. A surprising 42% of households surveyed that planned to buy a computer in 1995 did not know what brand they would purchase. Any vendor that can capture just a few percentage points of these consumers will go a long way toward improving its market share.

### Apple
**(N/A)**

**Market share:** 13.5% (of the 7.6 million consumer PCs shipped in the United States in 1994)

**Strengths:** increasingly price competitive, feature-set leader; unique, dedicated customer base

**Weaknesses:** still expensive compared with PCs, dwindling number of consumer software titles relative to PC, can't break out of "Apple-only" market to be consistently considered against PCs

### Digital
**(460 retail locations, 600 by end of March)**

**Market share:** N/A

**Strengths:** interesting work-at-home focus, good brand recognition, leverageable business units (printers, multimedia)

**Weaknesses:** unproven in retail, may find it tough to compete against HP as a "new" retail PC vendor

### AT&T GIS
**(2,500, 4,000 by yearend)**

**Market share:** N/A

**Strengths:** virtually unmatched communications expertise (from larger AT&T)

**Weaknesses:** difficult to differentiate with communications in retail (as opposed to business); somewhat unproven, may find it tough competing against Digital and HP for "new" shelf space

## As the United States Leads, Will the World Follow?

It is easy to forget in the current excitement that the home computing market was a holy grail for years. Packard Bell did not gain its prominence overnight; its position is the result of years of dedication and hard work. The road to the home PC promised land is actually littered with the remains of other PC companies that were not so fortunate (or savvy). Now that the U.S. market is blossoming, the rest of the world will likely follow. Many of the regions we surveyed are driven by the desire to work at home like the U.S. home PC market a few years ago. Nonetheless, the transition to a mature home computing market is already underway and will probably accelerate. Some international regions will likely even skip the job work-centric stage as the global home market heats up and perhaps surpasses the business segment in size and importance.

Let us also not forget that even in the United States, there is plenty of room for continued growth. Not only are there many undecided homes to sell computers to, but next-generation products and services, fueled by the colliding computer and entertainment industries, loom large and tantalizing on the horizon.

*— For more information on IDC's* Global Home Market Survey *contact Carol Page at (508) 935-4555*

### Hewlett-Packard
**(310 Circuit City stores)**

**Market share:** N/A

**Strengths:** strong brand name, very high retailer interest, leverageable printer business, reputation for quality

**Weaknesses:** unproved/new division sure to stumble, can be overly conservative

### IBM
**(8,000)**

**Market share:** 12.0% (of the 7.6 million consumer PCs shipped in the United States in 1994)

**Strengths:** excellent brand recognition, improved product line

**Weaknesses:** poor execution, high price, channel perceives it to be difficult to work with

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# The Maturing LAN Server Market: Solutions Sell

Many of the IT market's hottest buzzwords — downsizing, open systems, and client/server — are phenomena driven by the LAN server market. Whether a cause or result of this buzzword status, the worldwide LAN server market is undeniably hot given a 1993–1998 CAGR in revenues of 21.6% (19.4% in units). This rapid growth comes as little surprise, though, since companies continue to claim that in the next several years they will downsize much of their midrange and mainframe workloads to LAN servers.

Mere presence in this market does not, of course, dictate profits. Firms are demanding increased returns on their LAN server investments in terms of new functionality, cost savings, improved efficiency, or some combination of these. Indeed, customer expectations for server platforms are at an all-time high, and as a result simply selling a "box" is not enough — true solutions are required.

As the growth rates indicate, the LAN server market is a rapidly growing one that is creating opportunity for vendors throughout the IT food chain. Consider the following:

- By 1998 worldwide LAN server shipments will nearly double to 2.6 million units from a base of roughly 1.4 million in 1994.

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- Worldwide LAN server market revenues will more than double from 1994 to nearly $18 billion in 1998.
- Outside the United States and Western Europe, the LAN server market will experience rapid expansion with a 1993–98 compound annual growth rate of 31.5%.

As impressive as the market's growth is, our numbers still understate the total opportunity. Servers, after all, are a linchpin in the network because a successful server sale opens doors to other revenue possibilities. Capitalizing on this opportunity, however, is at the same time becoming more important and more complicated. So, in addition to highlighting IDC's forecast for LAN servers, this issue of *The Gray Sheet* will also discuss the market's dynamics.

## What Is a LAN Server?

A LAN server is an intelligent device on a local area network that provides various "services" to the intelligent desktop devices on that network. (IDC does not consider devices that provide file and application access to dumb terminals and/or PCs in terminal emulation mode LAN servers.) There are five different LAN server segments: nondedicated PC servers, PC desktop servers, PC servers, super servers, and dedicated small-scale servers.

IDC further classifies two types of LAN servers: file servers and application servers. A file server runs the core network operating systems (NOSs) enabling file sharing, print sharing, administration, and internal LAN communications. An application server provides users access to applications including database, e-mail, fax, workgroup/workflow, and/or communications.

## Rampant Growth

In 1994, the LAN server market experienced continued strong growth increasing 28.0% over 1993 in worldwide shipments and 23.0% in revenues (to 1.4 million units and $8.2 billion). Fueled by ongoing corporate investment in LANs (for downsizing, LAN-based applications, etc.), by 1998 the LAN server segment will generate more than $17.6 billion, representing 21.6% compound annual growth since 1993. By comparison, the 1993–1998 CAGR for worldwide total PC revenues is roughly 17.0%.

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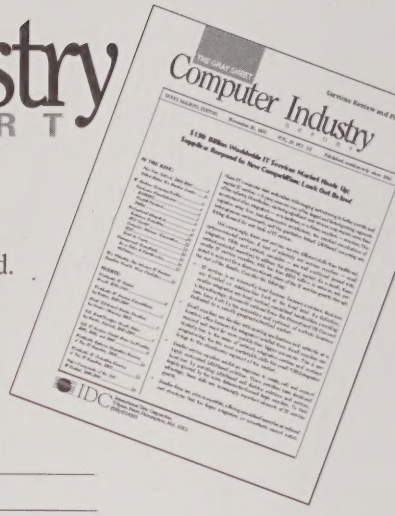


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LAN Server Segmentation

| Server Segment | Definition | Examples |
|---|---|---|
| Nondedicated PC server | PC functioning simultaneously as a server and end-user PC | Desktop system running a peer-to-peer NOS such as LANtastic, Microsoft WFWG, or Personal NetWare |
| PC desktop server | PC desktop implemented as a server; typically (more than 50% of the time) configured as a desktop | Compaq DESKPRO or Prolinea HP Vectra U series, IBM PS/2, ValuePoint |
| PC server | PC sold, marketed, and built as a server; typically (more than 50%) configured as a server | Compaq ProSignia VS; Prosignia and ProLiant 1000; HP LM, LF, and LC; IBM PS/2 Server 85, 95, 195, and PC Server family |
| Super server | Microprocessor-based system (primarily Intel) that supports multiple processors | AST Manhattan SMP; Compaq ProLiant 2000 and 4000; IBM 295; all NetFrame servers; all Tricord servers |
| Dedicated small-scale server | Minicomputer and/or workstation that is a dedicated LAN server | DEC VAX 3000 and 4000; HP 9000 Series 800 and 700; IBM RISC S/6000 and AS/400; Sun SPARCserver |

*Source: International Data Corporation, 1995*

From a geographic perspective, the United States accounts for the majority of LAN server shipments and revenues, even through 1998. The U.S. market will increase considerably — to over a million units by 1997 — but will not keep pace with the total market's torrid pace. Western Europe, which accounts for roughly 30% of the world's LAN server market, will match overall expansion, consistently accounting for about one-third of the market's units, revenue, and installed base. Regions that make up IDC's "rest of world" category — like Latin America, Asia Pacific, and Eastern Europe — will experience a surge in demand for LAN servers over the next several years. By 1998, ROW will make up almost one-third of the LAN server market.

As a result, LAN server vendor activity will likely remain U.S.-based and focused. However, as some vendors have already learned through their efforts in Europe and Latin America, a solid localized effort outside the United

## Compaq

**Worldwide share of the PC LAN server market, units, 1994:** 29.1%

**Strengths:** Best product line, strong system management and ISV relationships, marketing powerhouse. Hit pricing sweet spots in 1994.

**Weaknesses:** No in-house midrange leverage, channel challenge with high end, little mind share with old-time IS.

## Worldwide LAN Server Market by Region, 1992–1998

| | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | CAGR (%) 1993–98 |
|---|---|---|---|---|---|---|---|---|
| *Shipments* | | | | | | | | |
| **U.S.** | 453,837 | 565,650 | 700,439 | 845,877 | 984,043 | 1,059,608 | 1,107,538 | 14.4 |
| % growth | N/A | 25 | 24 | 21 | 16 | 8 | 5 | |
| % of WW | 53 | 52 | 50 | 49 | 47 | 44 | 42 | |
| **Western Europe** | 271,935 | 327,502 | 416,122 | 526,711 | 634,817 | 710,501 | 764,729 | 18.5 |
| % growth | N/A | 20 | 27 | 27 | 21 | 12 | 8 | |
| % of WW | 32 | 30 | 30 | 30 | 30 | 30 | 29 | |
| **ROW** | 123,106 | 194,686 | 270,513 | 371,488 | 497,196 | 638,092 | 764,729 | 31.5 |
| % growth | N/A | 58 | 39 | 37 | 34 | 28 | 20 | |
| % of WW | 15 | 18 | 20 | 21 | 24 | 27 | 29 | |
| **Worldwide** | 848,878 | 1,087,837 | 1,387,074 | 1,744,076 | 2,116,056 | 2,408,201 | 2,636,995 | 19.4 |
| % growth | N/A | 28 | 28 | 26 | 21 | 14 | 10 | |
| *Revenues ($M)* | | | | | | | | |
| U.S. | 2,693.9 | 3,328.9 | 3,918.7 | 4,907.9 | 5,785.7 | 6,491.5 | 7,433.2 | 17.4 |
| % growth | N/A | 24 | 18 | 25 | 18 | 12 | 15 | |
| % of WW | 52 | 50 | 48 | 47 | 45 | 42 | 42 | |
| **Western Europe** | 1,726.2 | 2,197.0 | 2,612.5 | 3,272.0 | 3,965.5 | 4,714.1 | 5,397.9 | 19.7 |
| % growth | N/A | 27 | 19 | 25 | 21 | 19 | 15 | |
| % of WW | 33 | 33 | 32 | 31 | 31 | 31 | 31 | |
| **ROW** | 810.8 | 1,131.8 | 1,632.8 | 2,374.8 | 3,250.4 | 4,250.4 | 4,867.0 | 33.9 |
| % growth | N/A | 40 | 44 | 45 | 37 | 31 | 15 | |
| % of WW | 16 | 17 | 20 | 23 | 25 | 28 | 28 | |
| **Worldwide** | 5,230.8 | 6,657.7 | 8,164.0 | 10,554.7 | 13,001.6 | 15,456.1 | 17,698.1 | 21.6 |
| % growth | N/A | 27 | 23 | 29 | 23 | 19 | 15 | |
| ACV ($) | 6,162 | 6,120 | 5,886 | 6,052 | 6,144 | 6,418 | 6,711 | |
| *Installed base* | | | | | | | | |
| U.S. | 1,702,449 | 2,151,195 | 2,662,027 | 3,249,178 | 3,729,325 | 4,160,810 | 4,697,264 | 16.9 |
| % growth | N/A | 26 | 24 | 22 | 15 | 12 | 13 | |
| % of WW | 61 | 57 | 55 | 53 | 50 | 47 | 46 | |
| **Western Europe** | 844,190 | 1,165,857 | 1,548,815 | 1,886,227 | 2,312,182 | 2,655,836 | 3,063,433 | 21.3 |
| % growth | N/A | 38 | 33 | 22 | 23 | 15 | 15 | |
| % of WW | 30 | 31 | 32 | 31 | 31 | 30 | 30 | |
| **ROW** | 267,327 | 443,778 | 629,206 | 949,198 | 1,417,144 | 2,036,141 | 2,450,747 | 40.7 |
| % growth | N/A | 66 | 42 | 51 | 49 | 44 | 20 | |
| % of WW | 10 | 12 | 13 | 16 | 19 | 23 | 24 | |
| **Worldwide** | 2,813,966 | 3,760,830 | 4,840,048 | 6,084,603 | 7,458,650 | 8,852,787 | 10,211,444 | 22.1 |
| % growth | N/A | 34 | 29 | 26 | 23 | 19 | 15 | |

*Source: International Data Corporation, 1995*

States can yield impressive results. A top market share position in the United States does not dictate dominance abroad — especially in the server market where high-quality, localized service and support can outweigh market share in an instant. Thus, international regions not only represent an enticing opportunity because they will grow dramatically, but because the playing field is more level.

## LAN Server Platforms: The PC Server Rules

Nineteen ninety-four was the year in which the PC server market emerged, accounting for more of the LAN server market's revenue than any other segment. Previously, PC desktop servers held the top spot. This shift reflects the segment's maturity. In 1994, PC LAN servers were not just tweaked desktop PCs, but distinct systems making up a unique market. A standard desktop PC running a NOS is no longer sufficient for many organizations that are expanding both the extent and importance of their LAN server usage. Instead, customers are demanding more integrated and tailored solutions, with specialized hardware (more advanced and faster storage, high-speed network controllers, etc.) and software (configuration and management utilities).

PC servers will continue to thrive, growing from 42% of worldwide LAN server revenues in 1994 to 59% in 1998. Meanwhile, the PC desktop server segment will have virtually flat revenues. As a result, its share will decline, with revenues falling from 33% of the worldwide total in 1994 to only 17% in 1998. Although unit shipments are relatively small, the super server category will experience respectable growth and nearly triple from $1.1 billion (or 14%) in 1994 worldwide revenues to $3.2 billion (18%) in 1998.

### IBM

**Worldwide share of the PC LAN server market, units, 1994:** 18.0%

**Strengths:** Solid relationships with old-time IS, leverageable system business, best system-management product.

**Weaknesses:** Wavering PC business. Has failed to market key ISV relationships, little success with small/medium-sized businesses.

Most successful PC server vendors share the following traits:

- **They offer complete solutions.** In 1994, Compaq attacked the LAN server hardware market with software. The vendor combined its usual aggressive marketing campaign with Compaq-branded software utilities, prudent ISV relationships, and a multitude of joint announcements to create a powerful solutions-oriented campaign. In particular, Compaq's SmartStart CD-ROM-based server-setup software and Insight Manager server-management software transformed Compaq's servers into "solutions." No single piece of this strategy was new; nonetheless, the result of their combination is unde-

## Hewlett-Packard

**Worldwide share of the PC LAN server market, units, 1994:** 14.9%

**Strengths:** Superior service and support, system-management investments, aggressive low-end offerings, good channel relations.

**Weaknesses:** Has not effectively publicized ISV relationships, lacks server-setup software.

niably impressive: in 1994 Compaq owned nearly a third (29%) of the worldwide PC server market.

Compaq's strategy was the result of investments in its own software expertise and in its ISV relationships. In areas where it could not find appropriate partners (or associations with the available partners would not add significant value) — like utilities for basic server setup and management — it created its own products. However, when suitable and powerful partners existed with which Compaq could align itself and benefit from the association, Compaq joined hands. Not surprisingly, these software firms included the major network and database software companies, including Novell, SCO, Microsoft, and Oracle.

So far, PC server vendors have failed to create meaningful partnerships with software companies in important server application categories like e-mail, groupware, and remote access. Because such applications represent the next generation of PC LAN use, this void is a significant opportunity. PC server vendors should also expand their server management functionality to include automated load balancing, performance tuning, and failover capabilities.

- **They do not neglect the low end.** Small businesses and remote sites will comprise an increasing portion of the overall PC server market during the next several years. Low-end products need to be affordable and easy to procure, install, and manage (with a remote emphasis). Vendors that ignore this segment will miss out on significant volume.

- **They offer a high-end system feature/function mix.** Scalability, overall capacity, advanced architecture, and high-availability/-reliability features will continue to be key differentiators in high-end PC server sales. Overall system balance will determine performance as ever-faster processors outpace supporting systems. Advancements in bus architecture (like PCI) and storage should help in this regard, but ultimately server vendors must piece together well-

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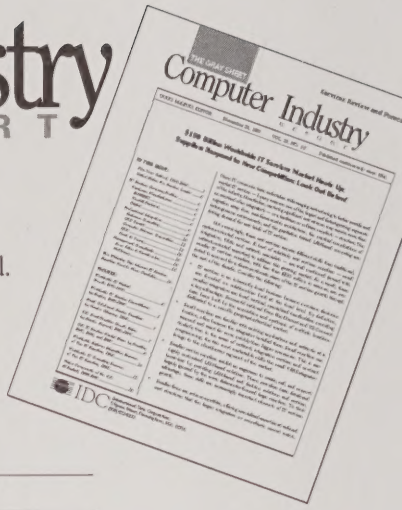


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balanced offerings. Other high-end server functionality will include ECC memory, RAID support, other redundant componentry, and hot-swap capabilities.

- **They sell directly via indirect channels.** As IS departments become more involved with LAN procurement, a direct "look and feel" in PC server sales is critical. Old-time IS shops are accustomed to dealing with system vendors, not resellers. As most of today's LAN sales go through indirect channels, LAN server vendors must provide direct sales teams to work with the channel in pre- and postsales activities. Hewlett-Packard's Corporate Account Reps (CAR) program is a good example of VAR-assisted selling.

- **They target vertical markets.** PC-server vendors should increase their industry-specific activities. Vertical market programs should target the top VARs and application suppliers in an industry. Industries that are aggressively adopting LANs include insurance, utilities, and health care.

The growth and revenue opportunity in the LAN server market is impressive by most any measure. Even IDC's forecast understates the total revenue opportunity — for example, successful server sales lead to client PC sales and service and support contracts. At the same time, though, the LAN server market is getting more competitive as most systems vendors, PC or otherwise, become attracted to this high-growth, relatively high-margin, market.

In the midst of this heightened competition, the barriers to entry in the LAN server market are increasing. In order to deliver complete solutions, more than hardware is required. Software expertise (systems management, ISV relationships, and ease-of-use tools), service and support infrastructure, and cost-effective low-end solutions are key areas in which vendors need to invest in order to be successful.

— Information in this issue of *The Gray Sheet* is based on the IDC Commercial Systems and Server group's *Analysis of the LAN Server Market* report (IDC #9640). Please contact Linda Rich at 508-935-4389 for more information.

# The Differentiation Dilemma

For PC vendors to differentiate themselves is harder than ever. With the advent of the Pentium chip, Intel has become a major supplier of motherboards, providing the building blocks for Pentium PCs offered by Dell, Gateway 2000, and many, many others. As the chip giant more regularly creates faster processors, not to mention supporting silicon like that required for the PCI bus, its motherboard business will continue to grow. Only a few years ago, if a PC firm did not want to design its own motherboard — which was much easier to do then — there were a multitude to choose from.

Not so today. Over the past year and a half, Intel has been virtually the only sensible source of Pentium motherboards. For PC companies, Intel's success in motherboards presents a problem. How do you set yourself apart when you are using the same fundamental building block as your competition? The PC LAN server market, however, and particularly Compaq's server strategy over the past year, may provide a solution to this differentiation dilemma.

Compaq makes a great server. Not only does the market seem to think so given the company's 29% share last year, but even the competition would likely admit it. However, what truly sets Compaq apart from its competition is not the hardware, but the stuff that comes with it — like software and service and support. Sure, Compaq's customers know that when they buy a ProLiant they are getting a high-performance, high-quality server. But several other vendors make good server hardware as well.

What makes Compaq's servers special is that they are easy to set up and maintain — thanks to SmartStart and Insight Manager — and they are backed by service and support that, while perhaps not without peer, are nonetheless excellent. At the end of the day a LAN administrator may feel good because the server has handled tons of transactions, but even better if those transactions were achieved with a minimum of fuss.

This type of nonhardware-based value-add is a key way in which PC vendors can differentiate their offerings, servers and otherwise. Intel and other silicon firms will increasingly be the companies that actually define PC hardware, not PC OEMs. What PC vendors really bring to the table is an ability to sell PCs, and this ability has less to do with hardware and more with marketing, software, distribution channels, service, and support.

This isn't news to many PC companies. In the consumer desktop PC market for example, Packard Bell's Navigator (Windows front end) and Compaq's relationship with Books That Work are examples of vendors providing unique nonhardware value. The news is that vendors must continue to innovate in terms of how they differentiate themselves, and hardware isn't the best way. PC companies that fail to provide unique nonhardware-based value might find themselves competing on price alone — not an admirable or long-term position in the dog-eat-dog PC business.

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# The Latin American IT Market: Robust Growth Amid a Sea of Change

The usually hardy computer industry is not proving immune to Mexico's faltering economy. Growth in 1994 IT spending in Latin America overall slowed to 11.7% from 1993 as the economic crisis in Mexico held back spending in the region's second-largest IT market. As a result of the Mexican situation, IDC has reduced its forecast for growth in 1995 to 11.3% (from over 16.0%). IDC expects that PC unit shipments could drop in Mexico in 1995 by more than 30% from 1994 levels.

However, despite the difficulties posed by the rapidly changing economic picture, Latin America's strong growth — particularly relative to other regions — has attracted the interest of many companies in the computer industry. Nearly every major IT supplier has made Latin America a priority over the past 24 months. As a result, the focus of vendor efforts has matured beyond basic market-entry campaigns to more advanced channel management strategies. After all, many IT segments in much of Latin America are dominated by a relatively small handful of channel partners (compared to those in the United States). To penetrate the Latin American market, IT vendors must develop relationships with these partners.

In fact, the consolidation of market power among the largest and most influential channel partners in each country is perhaps the most notable channel development in Latin America. Not surprisingly, the combined weight of the largest local channel partners varies widely in each country in the region and within each distinct technology market. Consider the following:

- In the more concentrated markets in the region — Chile, Colombia, and Mexico — IDC estimates that the top ten channel partners accounted for greater than 35% of total PC, network, and midrange product sales in 1993.
- In the more distributed markets — Argentina, Brazil, and Venezuela — the top ten resellers accounted for 19%, 18%, and 21% of sales, respectively.
- Mexico has a strong two-tier channel structure, with large distributors selling a high volume of products to

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smaller resellers. In 1993, an estimated 25% of PC, network, and midrange products were sold through the top four Mexican distributors, with more than 18% going through Ingram Dicom and MPS Mayorista.

- In contrast, Brazil's top ten channel partners represented just 18% of total PC, network, and midrange products and service sales in 1993. Although the top channel partners in Brazil are among the largest resellers in the region, they compete in a market with over 10,000 small dealers and VARs.

## Moving Forward in a Sea of Change

Open market conditions, combined with narrowing profit margins and falling prices, have left distribution-channel partners groping for identity and precious territory in Latin America. As major international vendors try to increase their market penetration and protect existing market share, they are establishing new channels and modifying old relationships. These actions are causing channel partners throughout the food chain to redefine themselves. Traditional small dealers, for example, are adjusting their skill sets and support capabilities to serve ever more demanding customers. VARs, meanwhile, are providing more end-user services, while distributors are becoming high-volume "box movers," focused on tight margins with few, if any, services.

This sea of change defines the maturing IT market in Latin America. In the midst of economic turmoil, hardware and software suppliers (hand in hand with their channel partners) are trying to navigate their way to a promised land of profits. Getting there will require flexibility by all participants as the market and the economy mature. Given the turbulent conditions, the journey may not be a smooth one.

This issue of *The Gray Sheet* highlights IDC's latest research into the growth and development of IT distribution channels in Latin America. In particular, this issue leverages a recent and extensive study of channel partners in the various countries of Latin America (IDC's *1994 Latin America Channel Partner Profiles* study). The body of the newsletter offers insight into the state of the IT market in the various countries of Latin America, including summary data from a small sampling of the many profiles, and pages 7– 8 offer a more detailed view of a sample profile.

## Distribution Trends by Country

Similarities exist throughout the region; however, each of the six countries IDC studied (Argentina, Brazil, Chile, Colombia, Mexico, and Venezuela) are at varying stages of channel maturity and have differing channel characteristics.

### *Chile*

The Chilean market is dominated by a top tier of players that accounts for an estimated 85% of PC, network, and midrange products and services in the country. The unusual concentration is due in part to the preeminence of Sonda — by far the largest reseller — which accounted for more than 26% of total IT sales in the country in 1993. Sonda alone represented 65% of Chile's midrange market and more than 20% of the services market.

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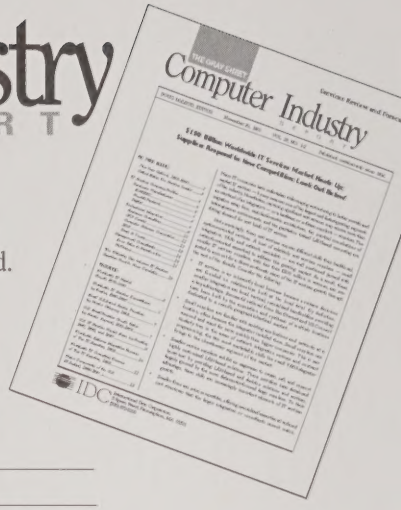


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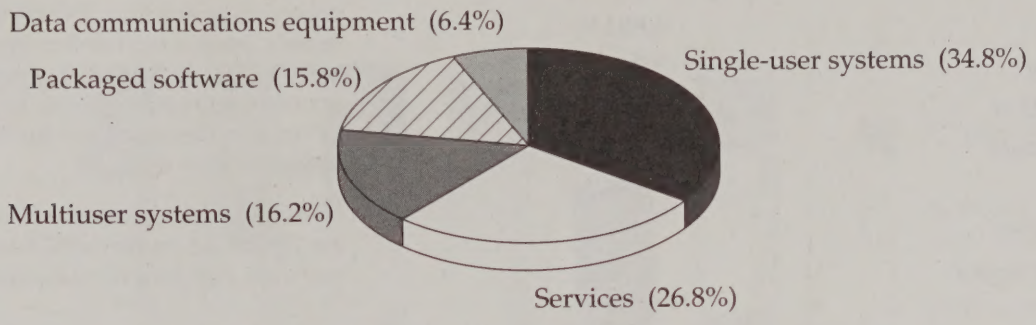
Volume 30, Number 12

IT Markets in Latin America, 1994




**Total = $11,687M**

*Source: International Data Corporation, 1995*

### *Colombia*

The relatively small size of the IT market in Colombia has left little room for smaller IT resellers. IDC estimates that the top ten channel partners in Colombia captured more than 40% of the market in 1993.

### *Mexico*

The prominence of major distributors and the concentration of the Mexican IT market reflect the region's extensive PC penetration. IDC estimates that for the top ten channel partners in Mexico, combined revenue from PC hardware, software, and peripherals accounted for more than 70% of total revenue in 1993. Another measure of the Mexican market's concentration is that the average revenue per employee in 1993 for the top ten resellers is more than twice the regional average.

### *Venezuela*

Venezuela's top ten resellers were the most network oriented of the leading resellers in the region, with nearly 25% of combined revenue coming from networking products. Similar to the Mexican market, Venezuela's top resellers were also heavily focused on PC hardware and software sales. More than 50% of their revenue came from PC products in 1993. Venezuela's top resellers also followed their counterparts in Mexico; the second lowest percentage of revenue was from midrange products and services.

## About IDC Latin America's Distribution Channel Research

Analysis and data in this issue of *The Gray Sheet* is excerpted from IDC's *1994 Latin America Channel Partner Profiles* study. This report series is a companion to IDC's *1994 Latin America Distribution Channels* study, published in April 1994. The latter study presents analysis of the distribution environments in Argentina, Brazil, Chile, Colombia, Mexico, and Venezuela. The goal of the profiles project was to build on the distribution channel study and develop an individual business summary on each of the major channel partners in the six primary IT-consuming countries of Latin America. The study includes 100 profiles. For more information about this report contact Paul Pastrone at 415-962-6461, or contact him at his Internet address: ppastrone@idcresearch.com.

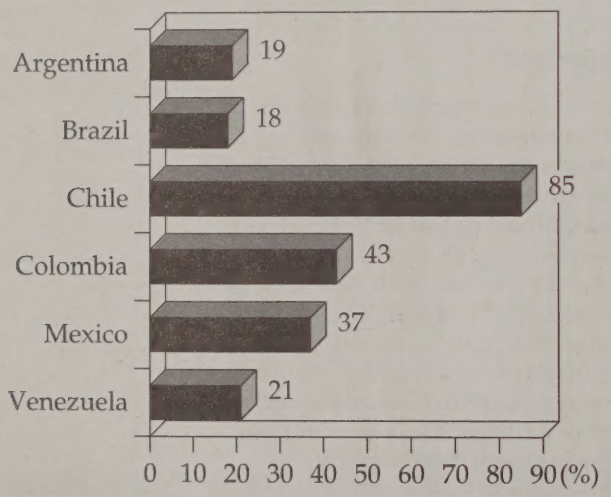
For the purposes of these profiles, a distributor is defined as a channel partner that receives less than 20% of its revenue from sales to end users. Dealers are distinguished as resellers that receive less than 30% of revenue from services; VAR services account for greater than 30% of total revenue. Systems integrators are considered to be VARs with a focus on providing all of the services that would be necessary to a client running multiple-system platforms. In some cases, such as the differentiation of dealers and VARs, a channel partner was categorized independent of these guidelines as a result of a more qualitative analysis of the company's involvement in the market.

Latin America IT Market by Country, 1994 ($M)

| | |
|---|---|
| Brazil | 4,981.9 |
| Mexico | 3,267.3 |
| Argentina | 1,258.8 |
| Venezuela | 508.8 |
| Chile | 555.2 |
| Colombia | 441.8 |
| Rest of region | 673.2 |

*Source: International Data Corporation, 1995*

Proportion of Midrange, Network, and PC Hardware, Software, and Services Sold Through Largest 10 Channel Partners, 1993




*Source: International Data Corporation, 1994*

## PC Products

In the regional PC market, sales of PC products through resellers are most concentrated in Chile, Colombia, and Mexico. IDC estimates that Chile's top ten resellers represented more than 50% of total PC product sales in the country during 1993. Colombia and Mexico's top ten resellers held the next largest portions of their respective PC markets, with 41% of the market for Mexico's top ten resellers and 31% for Colombia's leading resellers.

Argentina and Brazil had the least concentrated PC markets, with the top ten resellers representing only 10% and 11% of PC spending, respectively.

Distribution of PC products in Brazil is highly fragmented among thousands of small dealers. The revenue of these dealers comes to less than $50,000 (U.S.) per month. Brazil's top resellers depend least on PC product revenue, and this actuality reflects the greater importance of larger systems and services in the Brazilian market.

Venezuela's top ten resellers accounted for 18% of the country's PC hardware, software, and peripheral markets.

## Networking Products

Distribution of networking products in Latin America is highly focused among the largest channel partners in the region. The top ten partners in Chile, Colombia, Mexico, and Venezuela all accounted for more than 50% of the network market in their country during 1993.

IDC estimates that nearly 90% of the total networking sales in Chile are channeled through the top ten resellers in the country, and nearly 83% of total networking sales in Colombia go through the top ten resellers. Argentina's leading resellers represented 37% of network distribution; Brazil's top resellers captured only 19%.

Chile and Colombia achieved such concentration in the networking market partially as a result of smaller market size. Top network resellers in Chile include Cientec, Teknos, Tandem Chile, and ASC, each with more than 10% of the market in 1993 — Cientec accounted for more than 25%. Leading network resellers in Colombia's market included Coldatos, Informática Limitada, and Procecali. Coldatos was also able to capture roughly 25% of the network revenue in its local market.

Many of the networking companies in Venezuela are trying to expand into other countries within the region, particularly in the nations of the Andean Pact and the Caribbean. This is indicative of the formation of a concentrated channel for network product distribution in Venezuela and may reflect a rapid acceptance of client/server and distributed computing in Venezuela. The prominence of resellers having a relatively large portion of revenue coming from networking products may also suggest

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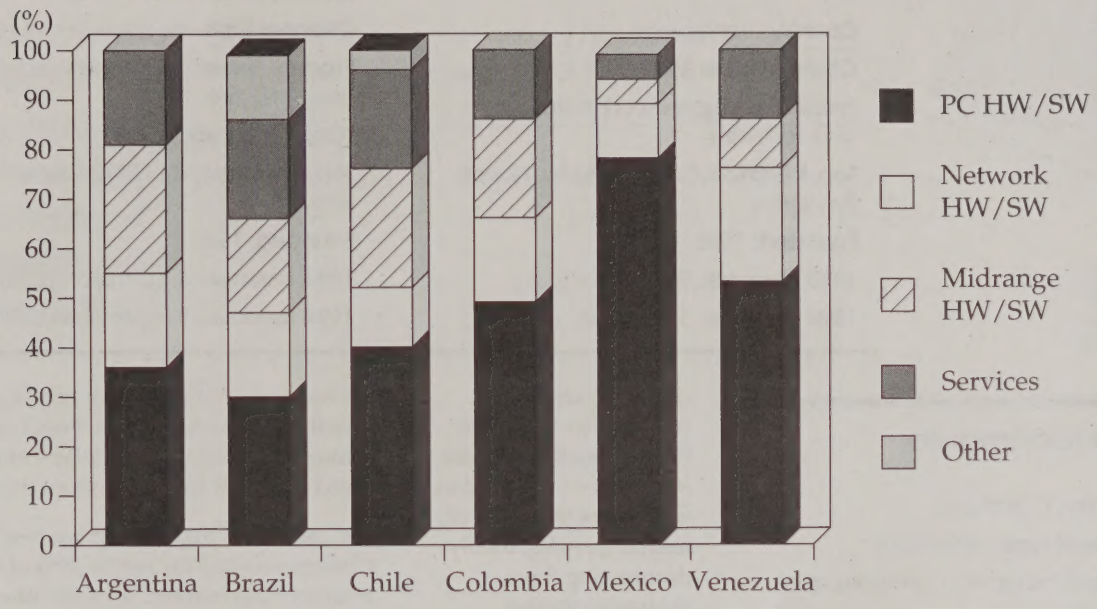
Latin America Channel-Partner Revenue by Product, 1993
(Top 10 Partners in Each Country)




*Source: International Data Corporation, 1994*

## Sonda

**Country:** Chile

**Channel type:** VAR/systems integrator

**Product focus:** midrange hardware and software

**Target markets:** banking, government, manufacturing

**Top 3 brands:** Digital, Microsoft, Novell

**Founded:** 1974

**1993 revenue:** $90 million (U.S.)

**1994 revenue:** $128 million (U.S., est.)

pent-up demand for networking products in Venezuela.

## Midrange Products

Although the largest resellers in the region are playing a critical role in distribution of networking products, only a small number of midrange hardware and software sales are going through large resellers. IDC estimates that the top resellers in Mexico, Venezuela, and Brazil accounted for less than 10% of the midrange market in each of the countries during 1993.

Mexico's top ten resellers represented an unusually low percentage of the midrange market at only 5%. This situation exists because large numbers of subsidiaries in the country have a direct sales strategy for midrange products. Among the largest midrange resellers in Mexico are Sistemas y Computadores de Gestion (SyC), Intersys Mexico, Grupo TEA, ECOMSA, and CIGE.

Brazil's midrange market is by far the largest in the region, representing more than half of midrange equipment shipped in Latin America. Like Mexico, however, the presence of subsidiaries with a direct sales focus has resulted in a fairly small percentage of the Brazilian midrange market captured by the top ten resellers. Leading resellers in Brazil captured only 11% of the country's midrange market in 1993.

In contrast to the other countries in the region, large resellers in Chile play a critical role in bringing midrange products to market. IDC estimates that in Chile the top ten resellers sold nearly 95% of the

## Cygnus Integradores de Sistemas

**Country:** Venezuela

**Channel type:** VAR

**Product focus:** network hardware and software

**Top 3 brands:** Cisco Systems, Novell, Synoptics

**Founded:** 1985

**1993 revenue:** $12 million (U.S.)

**1994 revenue:** $18 million (U.S., est.)

## CPM

**Country:** Brazil

**Channel type:** dealer

**Product focus:** midrange hardware and software

**Target markets:** banking

**Top 3 brands:** AT&T/GIS, Filenet, Hitachi

**Founded:** 1985

**1993 revenue:** $160 million (U.S.)

**1994 revenue:** $180 million (U.S., est.)

## Makrocómputo

**Country:** Colombia

**Channel type:** distributor

**Product focus:** PC hardware and software

**Top 3 brands:** Acer, Microsoft, Seagate

**Founded:** 1983

**1993 revenue:** $18 million (U.S.)

**1994 revenue:** $50 million (U.S., est.)

country's midrange products in 1993. The largest reseller in Chile — Sonda — weighed in with more than 65% of midrange sales, totally dominating the midrange market.

Colombia's midrange market was also fairly concentrated. Almost 40% of midrange products went through the country's top resellers. Argentina followed, with the top resellers achieving 21% of midrange product distribution in Argentina during 1993.

## Services

The top channel partners in Latin America captured a smaller percentage of the total services market than any of the other IT categories covered in the profile project. This may be a reflection of the prominence of distributors and lack of service providers profiled in this series.

In Mexico, where the top resellers represented only 4% of total 1993 services revenue, six of the top ten resellers were distributors. In Argentina, Brazil, and Venezuela, the top ten resellers also captured less than 10% of service revenue.

IDC estimates that the top ten resellers in Chile accounted for nearly 39% of the total services market. As with other IT categories in Chile, much of the services market is owned by Sonda. Synopsis has also made a significant contribution. Together these companies represented nearly 30% of the services market in Chile during 1993.

Colombia's top ten resellers represented more than 25% of the country's IT services market. ComWare, STA, LASC, and Carvajal led Colombia's market in providing services, earning 22% of the market for services in 1993.

Although some distributors had fairly low service revenue, as expected, many of the top dealers and VARs earned significant revenue from services. The fact that the top resellers in these countries captured a smaller percentage of service spending more accurately reflects that services are frequently provided by the manufacturer or by third-party service organizations.

## IDC Analyzes Impact of Crisis on IT Spending

IDC Mexico has recently launched the *Mexico Technology and Business Update* newsletter. This bimonthly publication features data and analysis from IDC's latest surveys on user spending in Mexico (for further information, please contact John-Mark Clark at 415-962-6427, or contact him at his Internet adress: jclark@idcresearch.com).

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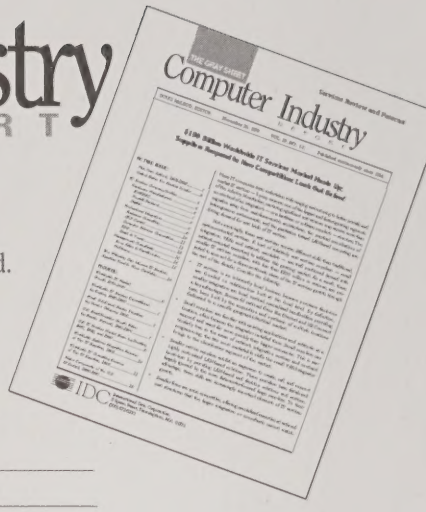


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# Merisel México

## Summary

**Channel type:** distributor

**Product focus:** PC hardware and software

**Top 3 brands:** Acer, Compaq, Hewlett-Packard

**Founded:** 1985

**1993 revenue:** $80 million (U.S.)

**1994 revenue:** $110 million (U.S., est.)

## Organization and Mission

Merisel México is a large distributor of PC and networking products in Mexico. The company was formed following the association of Dinamia, an IT distributor in Mexico, with Merisel, an international distributor of IT products, in May 1992. The new company, Merisel-Dinamia was then renamed Merisel México in May 1993.

## Financial Information

Total Merisel México revenue increased from $45 million (U.S.) in 1992 to $80 million (U.S.) in 1993, reflecting growth of more than 75%. This continues a trend of strong growth for Merisel as revenue has grown by more than 30% annually since 1986.

PC hardware and software sales represent the majority of Merisel revenue. In 1993 PC product sales represented 88% of the company's revenue, networking products represented 10%, and services contributed 2%. For 1994 Merisel expects revenue to rise by 37% to reach $110 million (U.S.), with a similar distribution of revenue by product.

## Products and Services

Merisel México began distributing Lotus, Okidata, and Samtron products in 1993. These products were added to an extensive list of brands already represented by the company. The principal brands represented by Merisel México by product type include the following:

- **Systems** — Acer, Apple, Compaq, Digital, Hewlett-Packard, IBM, Toshiba
- **Peripherals** — Canon, Epson, Hewlett-Packard, Lexmark/IBM, NEC, Okidata, Panasonic, Samtron, Star, Zenith
- **Software** — Aspel, Central Point, Computer Associates, Corel, Lotus, Microsoft, Novell, SCO, Stac Electronics, WordPerfect
- **Networking** — 3Com, Artisoft/Eagle Technology, Gateway, Novell, Standard Microsystems, Xircom
- **Unix** — Digiboard, Equinox, SCO, Wyse
- **Components/other** — 3M, APC, Colorado, Creative Labs, DPT, Dysan, Intel, Media Vision, Seagate, Sola Basic, Tripp Lite, Verbatim, VICA

Merisel revenue by product is divided as follows: CPUs and monitors 42%, software 18%, printers 12%, storage (hard disks and tape backup) 11%, power-supply hardware 5%, and "other" 12%. Products represented in the "other" category include computer accessories, connectivity hardware, communications hardware, and general supplies.

## Distribution Network

Merisel México sells all of its products to other resellers. Approximately 85% of Merisel sales are made to dealers, and 5% are made to distributors. The remaining 10% of sales are divided between superstores and department stores, each at approximately 5%.

Merisel has sales offices in Queretaro, Veracruz, and Villahermosa. The company also has three divisions with sales offices and regional distribution warehouses located in Guadalajara, Mérida,

and Monterrey, in addition to the main warehouse in Mexico City.

Roughly 50% of Merisel's business is generated within the metropolitan area of Mexico City. An additional 15% of sales revenue comes from Guadlajara, and 5% from Monterrey. The remaining 30% of Merisel revenue comes from sales in other areas of Mexico.

Merisel purchases 100% of its network hardware and software directly from the United States. Roughly half of PC hardware and software is purchased from the United States, and the remaining PC products are purchased from local subsidiaries and U.S. distributors. Purchases from local distributors represent approximately 35% of product orders. Purchases from dealers account for the remaining 15%.

Among Merisel's primary competitors are Ingram Dicom, Intertec, and MPS Mayorista.

## Marketing

Following the change in name from Merisel-Dinamani to Merisel México, the company launched a major campaign to publicize the new status of the company. Marketing efforts in 1994 also included a product catalog, promotion packets, attendence at trade shows, reseller promotions, fax promotions, and periodical advertising.

## Training and Support

In 1993 Merisel México organized a training forum for its resellers through Merisel called Softeach Mexico: The Computer Products Training Forum. Softeach is an annual event designed to update Merisel resellers on new products and assist with product marketing. Merisel also facilitates information transfer to its resellers through an online library.

## Future Trends

Merisel hopes to open new sales offices in Durango, Hermosillo, and San Lius Potosí. The company also plans to add new products as well as sales and support staff and to increase marketing and customer training efforts.

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# The European IT Market: A Vertical Perspective

As the European computer industry matures and expands — IDC expects it to grow from just over $145 billion in 1995 to nearly $179 billion in 1999 — profitable participation in it requires a better understanding of the area's vertical markets. Because each country in the region has a distinct character, a traditional way to examine Europe is to study the countries individually.

The information gleaned from a country-by-country analysis is useful, but goes only so far. Ultimately, individual customers drive sales, and understanding their needs is the clearest path to effective marketing — and in turn, sales. Another (and perhaps more enlightening) method of analysis is to examine the vertical markets that make up Europe's computer business. This method provides better insight into customers' needs and expectations and, by informing an IT vendor's strategy, can improve the likelihood of success.

Consider the impact on any IT product marketing campaign of the following European vertical market trends:

- The prospect for IT business in the manufacturing segment is not good in the textiles and clothing, food and drink, tobacco, and metals industries. However, other manufacturing markets — like those for office and computer equipment; rubber and plastics; electrical equipment; transport equipment; and pulp, paper, and printing — will consume an above-average amount of computer products and services.
- As a result of a recent slowdown, Europe's agriculture market will not buy much IT. To the extent that agriculture firms do purchase computer products and services, the focus will be on incremental, as opposed to radical, innovation, and thus demand will be price sensitive.
- The outlook for IT business in Europe's banking sector is excellent because deregulation is stimulating the emergence of integrated financial services markets. Banks and other financial companies are interested in radical innovation and are pouring money into client/server technology as they migrate from legacy systems to new architectures and applications.

June 30, 1995 Vol. 30, No. 13-14

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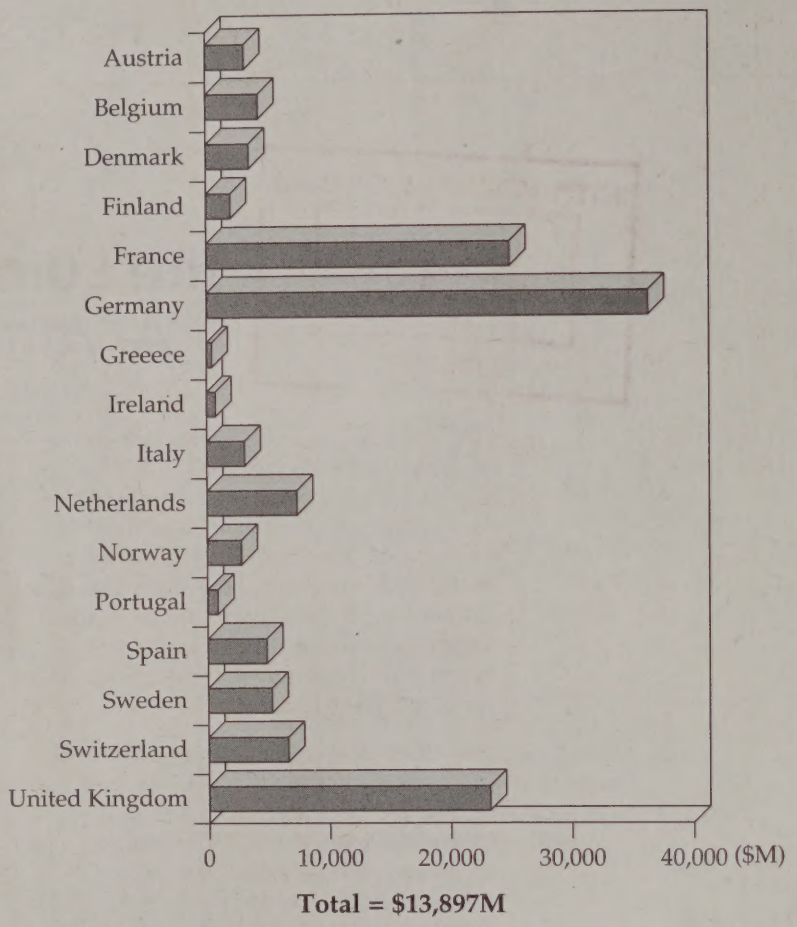
Western Europe IT Spending, 1994




**Total = $13,897M**

*Source: International Data Corporation, 1995*

This issue of *The Gray Sheet* presents an overview of IDC Europe's recently published *European IT Vertical Market Report*, which quantifies and qualifies the outlook for the IT market in 11 European vertical markets. In terms of "qualifying" the IT spending of these industries, two types of innovation are defined:

**Incremental innovation** — improving existing processes to increase efficiency and/or solve new problems. In the incremental category, price/performance is a key determinant of success. Typically, incremental innovation is tied to business cycles and is dependent on user attitudes toward price.

**Radical innovation** — attacking the competency and practices at their roots; reengineering. Because this type of innovation is usually tied to long-term strategies, price is less of an issue.

In general, although the business market is increasingly characterized by radical innovative attitudes, incremental gains in productivity remain the most common objective in the purchase of information technology. Meanwhile, the emerging home market is driven by radical innovation as it is fueled by entirely new consumer needs and desires. Home purchases also are generally viewed as long-term investments, relative to corporate acquisitions, and are less price sensitive.

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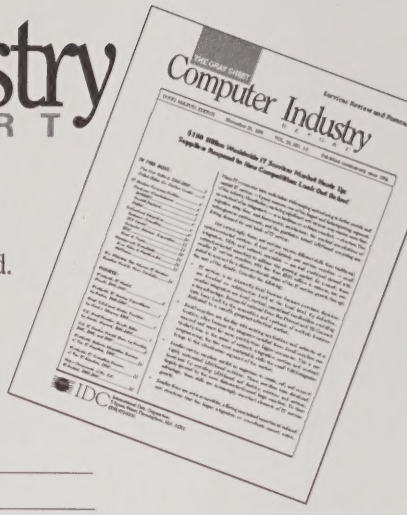


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Vertical markets with a greater propensity toward radical IT innovation tend to be evolving toward the information highway era. Such segments include:

- Transportation/communication/utilities
- Business services
- Finance
- Education

## IT Spending Dynamics

Expected growth in IT spending in each vertical market is a result of:

- User propensity toward investing in either radical or incremental innovation, or both
- The vertical market's particular business cycle

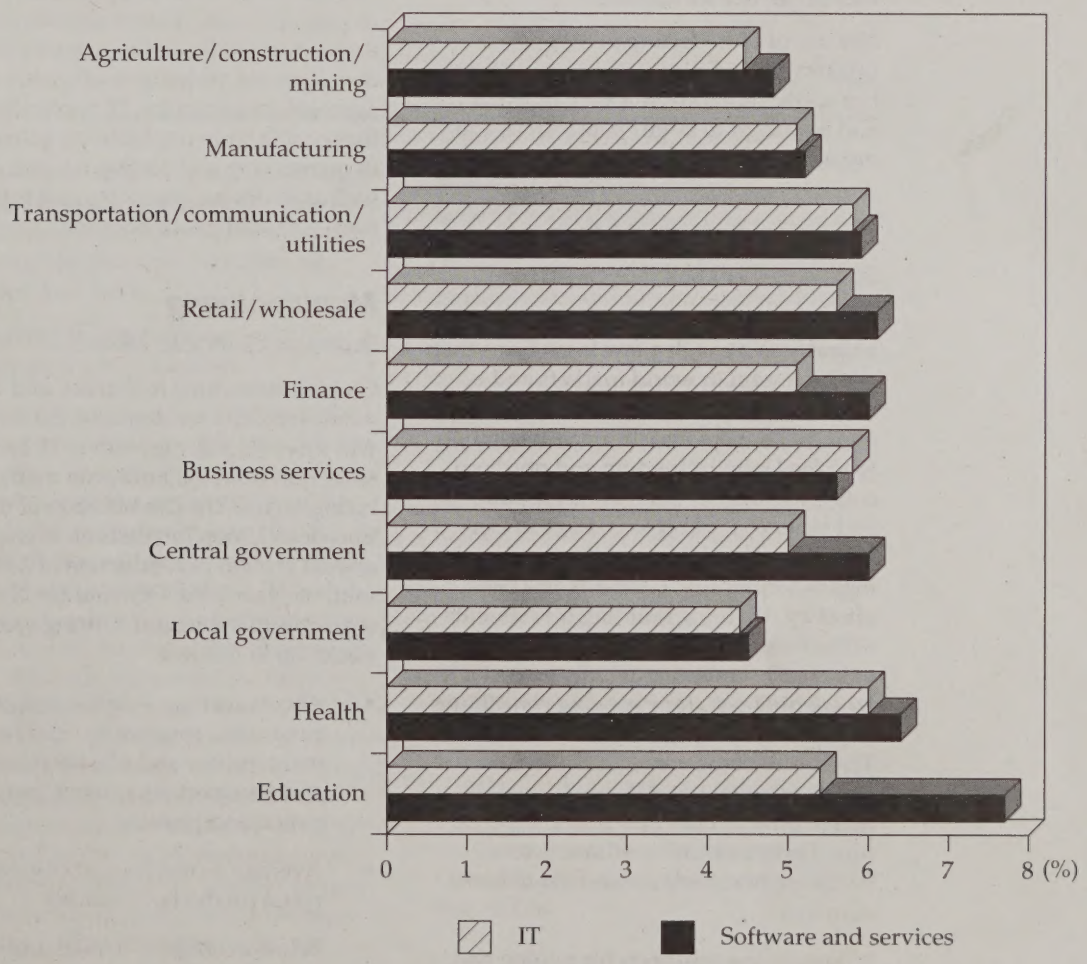
For total IT spending, sectors that will lead growth in the next few years will be:

- Health care
- Transport, communication, and utilities
- Business services

In software and services, the most important sectors will be:

- Health care
- Retail/wholesale
- Finance
- Central government

Vertical Market IT Spending Dynamics, 1993–1996, CAGR (%)




*Source: International Data Corporation, 1995*

Following is an outline of the major trends emerging in each vertical market.

## Agriculture

### Business Outlook: Low

Growth in agricultural production has been uneven across the European countries. For example, a recent slowdown — mainly in the livestock sector — occurred as a result of restrictions introduced in the European Union.

Nonetheless, various reforms are required given difficulties associated with gearing agricultural production to market requirements, avoiding long-term surpluses, coping with increasing support costs, and constraints imposed by world markets and the European Union's relations with partners.

### Prevailing IT Propensity: Incremental Innovation

The use of IT is starting to help control production and planning in agriculture, but applications are still very unusual and restricted to large cooperatives and organizations.

## Construction and Mining

### Business Outlook: Medium

Europe's construction industry is mainly a local activity with a few large firms that are successful in world markets and a myriad of very small operations. The early 1990s were disastrous years, initially in the United Kingdom and northern countries, then in Italy, France, Spain, and other central regions. Even in Germany, increased demand for new buildings in former East Germany has been offset by declining building investments in the western area. Activity is expected to increase, however, in large projects, where public-sector financing contributes to approximately half of total demand. The future of the construction industry is highly uncertain as it depends on economic growth rates and public expenditure. European Union infrastructure needs are nonetheless expected to boost demand.

In Europe the prospects for mining and quarrying businesses, which vary widely by size and operation, are unfavorable. Compared to other regions of the world, Europe's high costs — especially for hard coal — will cause production to decline to levels primarily determined by state policy and aid. For oil and gas, expected production losses in existing fields over the next 10 to 15 years will be partially offset by new fields coming on line.

Nonenergy mining and quarrying has suffered from large stockpiles and low demand in the case of metals and from oversupply and low mineral prices in the case of industrial minerals. Production is expected to grow only moderately in the short term; long-term prospects are brighter. Prices and markets should improve moderately with the general upturn of the economy.

### Prevailing IT Propensity: Incremental Innovation

The use of information technology in the construction and mining industries is changing rapidly. Future development in this sector will be tied to research and development, training, and quality management. In particular, IT applications that enable large productivity gains — as in quantifying and costing houses, as well as in design, planning, and estimation — should prove popular.

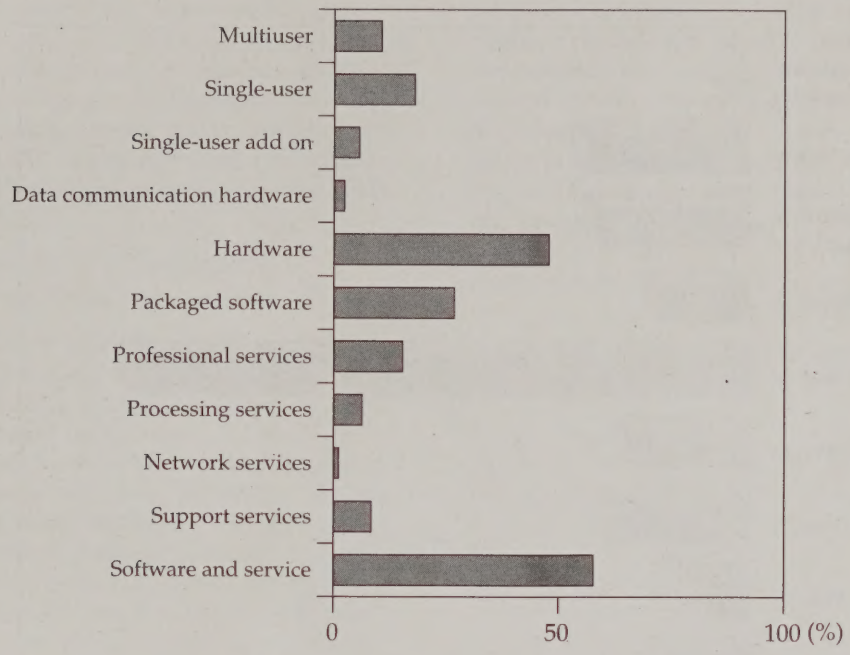
## Manufacturing

### Business Outlook: Mixed

Globalization, time to market, and optimistic forecasts for domestic demand will drive stronger growth in IT consumption from the European manufacturing sector. The Commission of the European Union forecasts an average annual growth in production of 2.6% until the year 2000. Demand for IT within segments of the manufacturing sector stacks up as follows:

- Above average — office and electronic data processing (EDP) equipment, rubber and plastics, electrical and transport equipment, pulp, paper, and printing
- Average — mechanical engineering, metal products, chemicals
- Below average — textiles and clothing, food, drink, tobacco, metals

Manufacturing IT Spending in Austria by IT Segment, 1996 (Estimate)




*Source: International Data Corporation, 1995*

Since 1994, favorable currency exchange rates in the Mediterranean countries have been driving high exports in traditional areas, such as footwear and clothing, ceramics, and food.

### Prevailing IT Propensity: Incremental Innovation

With the exception of Germany and the Scandinavian countries, the manufacturing sector's investment in IT continues to be at odds with the perception that this sector lacks investment vision. In fact, the manufacturing sector's attitude toward IT is becoming more strategic. This shift in disposition has yet to affect consumption; however, the outlook is improving. Thus, although companies continue to buy standalone packages to solve isolated productivity issues, increasing attention and IT investment are being targeted at entire business processes and achieving reduced inventories, faster development, and more flexible manufacturing. In the future, standards, systems integration, networking, and communications will play a more important role.

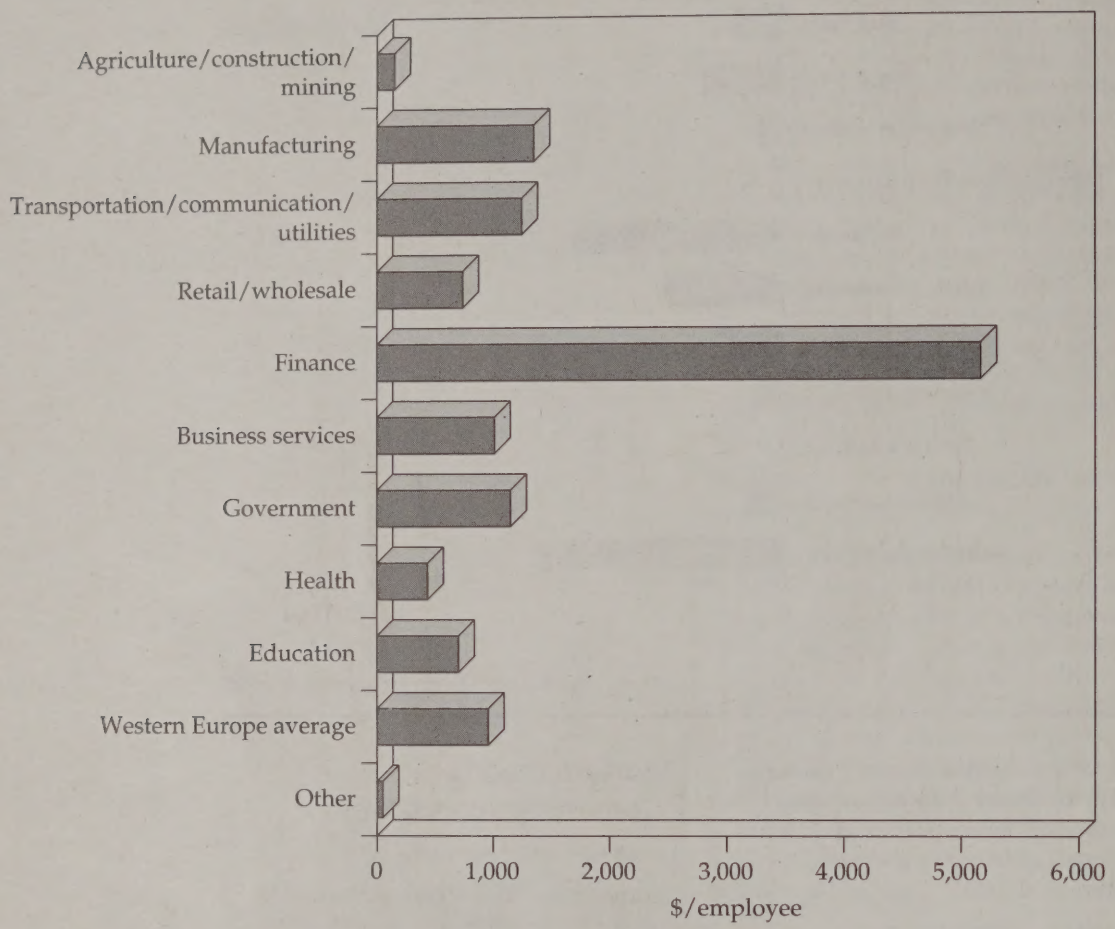
## *Transportation, Communication, Utilities*

### Business Outlook: High

Europe's transportation, communication, and utility markets are crucial sectors that will in large part define future economic developments. The transportation sector will undergo mergers and alliances as it faces heightened demand — fueled by European integration — and competition. Huge investments in this market's infrastructure will cause various networks to expand and new services to emerge.

Privatization initiatives and liberalization of telecommunication services and infrastructure, in addition to influencing information highway (i-way) evolution, will drive high business growth. Along with this growth will come intense competition as previously unheard of scenarios become reality — for example, Generale des Eaux competing against British Gas.

Western Europe IT Spending per Employee by Segment, 1994




*Source: International Data Corporation, 1995*

### Prevailing IT Propensity: Radical Innovation

Preparation for the i-way era requires complete rethinking of business models and the role that IT investment will play. And, companies in the transportation, communication, and utilities sectors will provide the networks, services, and systems that coordinate i-way services and their distribution. Firms in these markets may work in partnership with IT equipment vendors to develop these and other services.

Privatization will also lead the utilities to improve their competitiveness and ability to comply with environmental-control standards. As a result, more IT applications will likely be developed, such as databases for water archives that monitor pollution throughout various regions.

## *Retail/Wholesale*

### Business Outlook: Medium

The retail/wholesale sector is undergoing considerable restructuring including increased consolidation and fewer traditional wholesalers. To cope with this change, the sector has increased its use of technology with tendencies toward vertical integration, diversification, and internationalization. The outlook for

moderate growth is influenced by the completion of the European internal market and the opening of Eastern Europe. European Union actions in transport, competition, investment, structural-fund, and enterprise policy are intended to encourage growth. However, lowering per-capita income and consumer spending will also reinforce the market-share battle and influence the structure of the industry.

### Prevailing IT Propensity: Incremental Innovation

Retail/wholesale operators are faced with two opposing challenges. On the one hand, firms must expand activities and seek opportunities in European Union markets in order to face increased consolidation (the 1994 alliance between U.K.-based Sainsburys, French Docks de France, and Italian Esselunga chains is a notable response to this type of challenge). On the other hand, firms also need to respect local culture in the delivery of services, which limits the scope of any internationalization efforts.

Firms realize that they must invest in IT applications to control costs, manage operations efficiently, and improve productivity. More specifically, they have found that electronic data interchange (EDI), electronic point of sale (EPoS), and direct product profitability (DPP) techniques are essential tools in upgrading activities.

Nonetheless, most retail/wholesale organizations maintain a traditional approach toward IT: they are focused on data accessibility and supply-chain management applications. To the limited extent that IT is being applied more radically, it is focused on employee interactions with each other and with the customer. Telecommunications technologies are playing an important role as voice-mail messaging, "selling-through-screens" techniques, and electronic interactive shopping are used to enhance distribution companies' competitive edge.

## *Banking*

### Business Outlook: High

Europe's banking sector is undergoing dramatic change. Deregulation and liberalization are stimulating the emergence of integrated financial services markets in Europe. At the same time, shifts in saving behavior will increase the supply of funds on capital markets while regulation on credit and market risks provide desired stability. The overall torrid pace of change will be tempered by developments in individual country financial markets. Other important trends in financial services include disintermediation, securitization, the growth of derivatives markets, mergers and alliances, electronic banking, and other electronic markets.

### Prevailing IT Propensity: Toward Radical Innovation

Information and communication technology are driving change in the financial services sector. In terms of IT strategy, Europe's banks and financial companies (big spenders on IT) are committed to client/server technology and as a result are pouring increasing amounts of money into such solutions. However, the finance sector still relies on mainframes for central IT functions, such as customer databases.

The big challenge for banks and other financial companies is to leverage the convergence of media, telecommunications, and information technology to broaden their services, including the following:

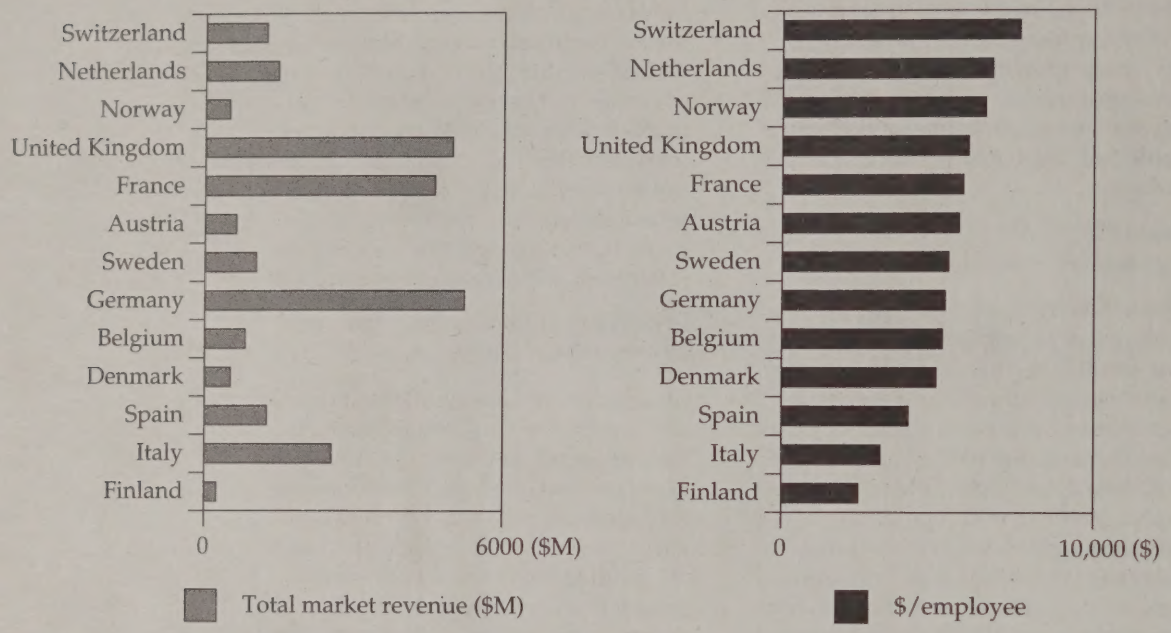
- New ways of providing traditional services, such as multimedia kiosks and 24-hour direct-banking services
- Entirely new services like teleshopping, travel, and insurance services

In countries where banking systems and user finance attitudes (toward electronic money, teleshopping, etc.) are more advanced, IT spending will increase in the short term.

By the year 2000, more than 90% of banks are expected to offer telephone banking services in Europe. However, "telebanking" technology is considered more a means of identifying new sales prospects than a way of giving the customer attention and service.

In the medium term, electronic data interchange, neural networks for risk analysis, and executive information systems will start to generate more interest.

Western Europe Banking IT Penetration,
Total Market Revenues vs. $/Employee Spending, 1993




*Source: International Data Corporation, 1995*

## *Insurance*

### Business Outlook: Mixed

After suffering turmoil and recessionary decline in the early 1990s, Europe's insurance sector has just started to experience a renaissance. Higher premiums and less expensive claims are reviving the profitability of key industry players. In the U.K.'s relatively advanced market, traditional insurance companies and their brokers are facing competition from the following:

- New "direct selling" insurance companies that both insure and sell, cutting out the broker
- Finance companies that are expanding into insurance

Privatization of the public insurance system in some European countries should accelerate this renaissance.

### Prevailing IT Propensity: Early Radical Innovation

The insurance industry is slowly recognizing that IT can enhance competitiveness and customer service. The old attitude — that it is possible to be successful with third-rate technology and excellent service — is being supplanted by an increasing need to better understand the source(s) of profits.

Historically, most large insurers have based their core processing systems on mainframes or proprietary minicomputers. Firms are downsizing and migrating to client/server architectures, but this move is still in its infancy. As a result, the relatively advanced U.K. market represents a niche for VARs, and this niche can provide insurance companies with a PC-based front end that allows them to preserve their mainframe investment. As a whole, the market is less ready for entirely new systems. Electronic communication with brokers is also an area of great interest, but conflicting standards must first be overcome.

## *Business Services*

### Business Outlook: High

Following considerable growth and development throughout the 1980s, Europe's business services sector forged on, unhampered by the recent recession. Greater general awareness of the benefits

of outsourcing has driven the developments in the sector. As the economic outlook continues to improve, business services performance is likely to strengthen in the near future.

### Prevailing IT Propensity: Toward Radical Innovation

Europe's management consulting firms, advertising agencies, and law firms are committed, at varying levels, to enhancing their clients' competitiveness through more competent and value-added services. To this end, IT applications are already being used to enhance business services operations and improve productivity. In the future, though, IT use will become more strategic since business services are at the core of the information highway revolution. In this regard, business services firms will act as both short-term innovators exploiting new communications abilities and as suppliers offering a wider range of services (potentially with other industry operators.

## *Government*

### Business Outlook: Low

European government bodies' IT spending is inhibited by European government budget cuts and slow procurement procedures. In general, public spending is nonproductive, and given interest-rate expense it is unlikely that the required funds will be generated to develop infrastructure and improve public services. Unfortunately, the outlook isn't good, either. High unemployment and lower incomes are further limiting funds that could be utilized for productive public use and investment. The situation with local governments is even worse.

### Prevailing IT Propensity: Incremental Innovation

Europe's defense and social security budgets not only are among the most important sectors being targeted for public spending cuts, they also are the largest contributors to government IT spending. The U.K. model of IT budget cuts is among the most interesting in Europe given its impact on the IT industry's growth and competitive environment. The government is testing public IT departments and has agreed to outsource staff and systems when the market offers less expensive solutions. Although the outsourcing is generating growth in the IT industry, concerns remain over issues related to security, confidentiality, and the ability of external suppliers to endorse and control public administration processes.

One of the greatest IT challenges for European governments is data communications. If the various governments could put public administration processes online and interconnect its information systems, several new applications and benefits would become affordable. Examples include a 24-hour tax helpline, self-service job centers with computerized job databases, and electronic processing of social security claims with automated payments. These opportunities will not be fully attainable, however, until new policies on information access and management ensure a balance between the benefits of electronically accessing information and services and the protection of privacy. Although such changes are not likely to happen in the short term, the issue is high on the agenda for many in Europe.

## *Health*

### Business Outlook: Mixed

Public health system reforms throughout Europe have created an uncertain climate in which users are reluctant to invest in new IT. Several IT project failures, especially in the late 1980s, have also fueled caution. Nonetheless, IT is considered to be at the core of health system privatization and reform.

### Prevailing IT Propensity: Early Radical Innovation

The health sector's IT mission will soon be focused on improving internal organization effectiveness and service quality. In the short term, the most important computing issues have to do with communications (LANs, WANs, EDI) and management information systems. As a result, software spending will grow. In the long term, Europe's health system intends to apply imaging and voice technology to enhance clinicians' practices and health organization processes.

### *Education*

Business Outlook: High

Although governments are reducing school and university funding in Europe, the education market is still fertile ground for IT development, given its openness to new technologies and educational methods. After all, participation by Europe's education sector will be a key determinant of the extent to which Europe experiences the information highway revolution.

In terms of size, the decline in school population (some 68 million young people at the beginning of the 1990s, against a peak of 73 million in 1977/78) is compensated for by the tendency to spend a longer time in school (27% of 19-year-olds were still being educated in Europe in the late 1980s, against 19% in the early 1970s).

Prevailing IT Propensity: Early Radical Innovation

Increasingly, primary schools are recognizing the benefits of multimedia, and the IT budgets of secondary schools are focused on educational software more generally.

In the future, schools will be challenged to do the following:

- Exploit networks, such as the Internet, that offer the contents of libraries and research institutes from around the world
- Offer integrated learning systems that can adjust themselves to a pupil's rate of learning

Reengineering the classroom requires more than simply adding new technology. Rather, a broad reevaluation of how teaching takes place and how the teachers' IT literacy can be improved is required.

Despite public spending cuts, U.K. schools have the highest technology propensity. In 1993, primary schools had, on average, seven computers (2.5 in 1988), while secondary schools had 58 (23 in 1988). Leading secondary schools in the United Kingdom spend up to £300,000 annually on IT — equivalent to the entire budget for the 200 schools in the Cologne area of Germany. The United Kingdom government has indicated its support by agreeing to fund schools' telephone bills if the IT industry will provide hardware and software to link schools to public networks. Fifty technology colleges have obtained £100,000 of private funding for IT from more than 120 companies; 350 primary schools are connected to a cable network. This year, extra grants will be made to companies that develop new educational applications for the information highway, and the government is devoting £3 million to equipping primary schools with CD-ROM equipment.

## Implications for IT Vendors

In order to do business effectively in Europe, IT firms must understand the region's vertical markets. Although it is important to comprehend the individual country markets, such information has limited utility. Ultimately individual customers drive sales, and understanding their specific needs and offering solutions targeted at them are the key to selling products and services. After all, a firm that tries to sell radical IT to a customer who is seeking incremental productivity gains will likely receive a lukewarm reception at best.

To this end, this issue of *The Gray Sheet* has examined many vertical markets that make up Europe's economy. Exceptions exist, but in general firms in the transportation/communication/utilities, banking, business services, and education sectors will increase their IT consumption and thus represent prime business opportunities. Many of these markets, coincidentally, are also looking to innovate through IT (as opposed to achieving incremental gains), including the transportation/communication/utilities, business services, finance, and education sectors.

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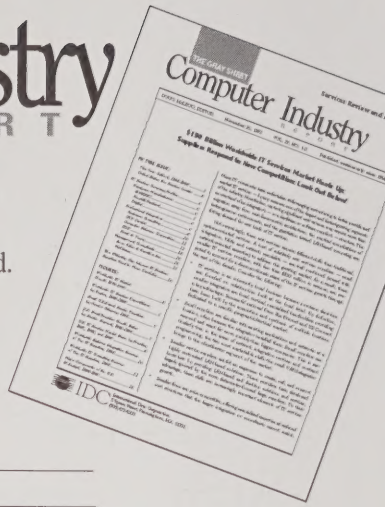


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## European IT Vertical Market Report, 1992–1999

As IT vendors move toward demand-oriented marketing tactics, their market intelligence requirements change. In order to wage a successful demand-focused campaign, it isn't enough for IT vendors to merely understand the general European market, or even individual country differences — vendors must also comprehend the customer's specific business. To serve this need, IDC Europe has written the *European IT Vertical Market Report*.

Typically, studies of IT adoption in vertical markets analyze either the purchase mix evolution (hardware, software, and services) or the architectural migration of MIS departments. For this report, however, IDC has chosen a top-down approach that rates individual vertical markets by their propensity toward innovation.

Quantitative analysis in this report on the size and scope of user IT spending and its growth by vertical market is provided for the 13 countries traditionally covered by IDC Europe's standard research. The level of expenditure and changing trends in each country are measured using two sources:

- Local research-office vertical market expertise
- IDC's *Global IT Survey* (based on 7,000 interviews)

User spending trends are monitored against growth patterns determined through:

- Supply-side interviews with vendors
- Ongoing analysis of new technologies and their impact on both new and replacement IT demand

The report's qualitative analysis is based on an expert reading of the drivers that shape quantitative trends. To this end, the report leverages IDC's *Global IT Survey*, which includes coverage of Germany, France, the United Kingdom, Italy, Sweden, and the Benelux countries (Belgium, the Netherlands, and Luxembourg). The survey enables a better understanding of the end-user environment in terms of users' current priorities, overall attitudes toward change, and other factors that influence their IT decision making.

More specifically, the report includes information on the current IT climate, future IT strategies, and spending trends, all presented by vertical market and country. In particular, attention is focused on how the role of IT is changing within organizations according to different patterns in each country. The effects of this change are measured through an analysis of IT spending patterns, attitudes toward new technologies, and the IT spending and decision-making processes.

A special section is dedicated to IT services issues to provide a thorough understanding of how different IT usage philosophies affect actual and potential IT market growth in each country.

Using this approach, the *European IT Vertical Market Report* uniquely illuminates the varied needs and local IT usage attitudes that set Europe apart from other major worldwide regions. More important, the study assesses these needs and attitudes for their impact on IT consumption, both positive and negative. By profiling "ideal customers" in each country, the study also targets users with the greatest propensity for strategic IT use. Finally, the report's conclusion advises IT planners on how to cope with the European IT market's uniqueness and make it a source of advantage.

For more information on this report, contact Luisa Bordoni at 44-181-995-8082.

# *The Gray Sheet — Special Edition* Report

*Gray Sheet* readers are already used to receiving excellent value, but with the *Special Edition* report, we're raising the bar a little higher. In short, *The Gray Sheet — Special Edition* report will include the U.S. five-year review and forecast data (1993–1999), as well as trend analysis, from nearly all of IDC's major research programs for less than $500.

If you haven't already, you will soon receive a separate mailing describing the report in greater detail, but to whet your appetite, here's a brief summary of what you'll find. *The Gray Sheet — Special Edition* report will include 1993–1999 U.S. unit shipments, value of shipments, and installed-base data for the following markets: PCs, multiuser systems, LAN hardware, PC operating systems, software revenue by system type (PC, server, multiuser), networking hardware, and software. In addition, the report will include analysis and extensive revenue data for the IT services market (maintenance, outsourcing, systems integration, etc.).

By virtually any measure, the *Special Edition* report offers an astounding amount of IDC's latest data at a low price. As many of you know, purchasing this data separately would cost easily more than 20 times the report's $495 price. Even those of you who already buy much of this research separately can readily appreciate the value of having all of the data in one place.

Although you will soon receive a separate mailing describing this report in more detail, if you're ready to buy now you can call Lisa Bloom at 508-935-4236. Those who buy the *Special Edition* in advance of its publication (the end of August) receive $100 off the $495 price… thus the prepublication price is **only $395!**

## *The Gray Sheet* — Web Site

We are still laboring away at *The Gray Sheet's* Web site — are **you** paying attention? It's not too late to be the first on your block (in your office park? in your country? *The Gray Sheet* is pretty global, after all) to check out our "under construction" Web site and let us know what you think. For all you know, there could be all kinds of **free illuminating analysis** and **free insightful data** that you won't find in the hardcopy. And what about the cool *Gray Sheet* T-shirts?

Well, some of this stuff isn't in stock yet, so you haven't missed it. But, it will be soon, and now is your chance to check our site out before the un-Grayed masses start hogging bandwidth. So, steer your favorite Web browser to **http://www.ocm.com/idc** and let me know what you think (Ted Julian, phone: 508-935-4237; internet: tjulian@idcresearch.com). I'll try to reward any particularly interesting ideas we end up using (after all, there are some game company *Gray Sheet* readers, and they probably have a number of fun CD-ROM titles they'd be willing to send me!).

Some of you may be interested to hear that we are linking our site to other computer-company and press Web sites. Our planned weekly "virtual editorial column" in particular is generating lots of interest since content is supposedly king (it surely makes for a more compelling, must-visit-regularly Web site). Give me a call (508-935-4237) or e-mail me (tjulian@idcresearch.com) if you, or anyone else in your company, is interested in this option.

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# Computer Industry REPORT

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# The LAN Market: Segments at a Crossroads

Although high-growth opportunities abound outside the United States for the sale of basic connectivity to first-time corporate clients, in order for strong growth in the local-area network (LAN) market to continue vendors must focus on emerging opportunities driven by new technologies and emerging customer segments. Perhaps the most fundamental factor driving this change is that the corporate market (especially in the United States) is approaching saturation. Basic connectivity (file and print services, e-mail, etc.) needs are fully understood and widely implemented by corporate IS. Corporate users are more concerned about next-generation issues like connecting as yet unconnected portions of the enterprise (remote offices) and upgrading existing connections to enable new applications. Outside corporate IS, significant potential exists in the small-business, small-office/home-office (SOHO), and home markets.

To capitalize on emerging technologies, IT firms must position themselves for success without alienating existing customers and jeopardizing revenue from markets in decline. For example, although 3Com needs to offer switching solutions, it doesn't want to emphasize this technology at the expense of its significant hub business. This strategy may sound simple, but its execution is not. Not only do new products and technologies complicate the sales process, but existing customers may not initially understand such products and/or may feel threatened by them. Geographical differences in technology adoption can make this already difficult balancing act particularly troublesome.

To capitalize on new customer segments, firms must offer complete solutions targeted at specific customer segments and needs. This is not to say that every customer type requires a different product. In some cases this may be true, but even when it is not, different distribution channels are likely required (each of which have their own requirements), as well as differentiated pricing, packaging, etc. Many IT vendors have missed this point and have tried to sell the same product, through the same channels, to the year's hot new customer segment. If a product is not positioned distinctly — if not in feature/technical terms, then in merchandising

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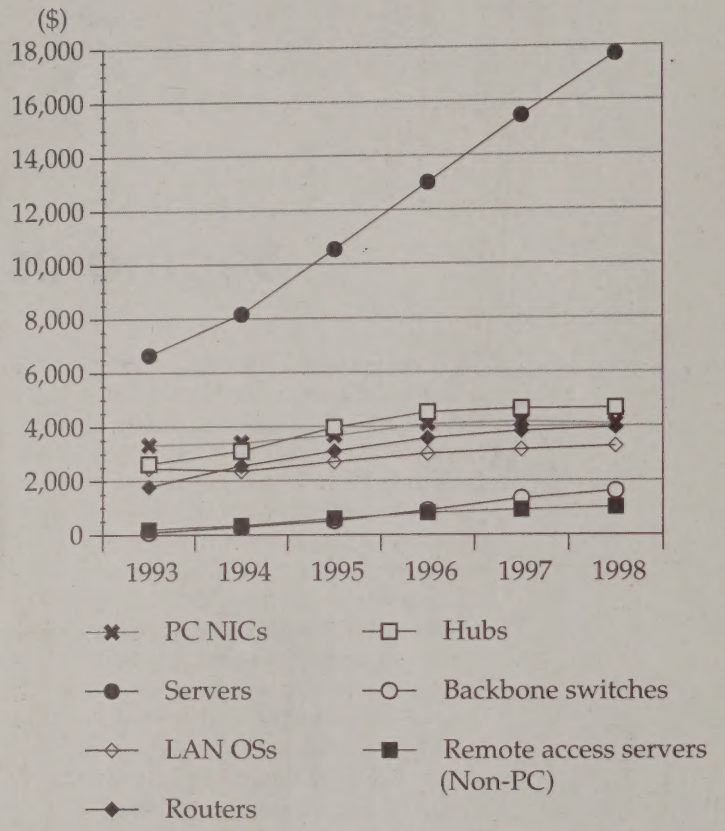
Worldwide LAN Revenues by Segment, 1993–1998 ($M)




*Source: International Data Corporation, 1995*

terms — it will likely fail to capture this new customer segment and will dilute the overall marketing message.

Despite their presence at this crossroads, LAN hardware and software markets continue to grow impressively. From a base of more than $17.1 billion in worldwide revenue in 1993, IDC forecasts the LAN segment to expand to a whopping $36.3 billion market in 1998 (a compound annual growth rate of 11%). Not only is this growth driven by the ongoing penetration of LANs into large businesses — as they continue to grow, extend, and upgrade their networks — but also by the implementation of LANs in small and medium-sized businesses (and even in some homes and home offices).

Of the segments that make up the LAN market, backbone switches and servers are among the fastest growing in terms of revenue, with 1995 to 1998 CAGRs of 81% and 22%, respectively. The server market's continued robust growth is particularly outstanding since it is also the largest LAN market segment. Given average server prices of $10K and up, its status shouldn't be too surprising; no wonder PC vendors are stumbling over one another to increase their business in this segment.

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Several LAN segments, however, will start to decline, not because of weak overall demand, but in response to technology shifts. After peaking in 1997, the PC network interface card (NIC) will fall off, victim of market saturation. Both the NIC and hub segments are shifting to higher-speed technology, which may provide a short-term window of opportunity for new or existing players to gain share.

## PC LAN Operating Systems

Of the segments that make up the overall LAN market, the PC LAN operating-system (OS) segment is arguably the most mature. The segment is, however, far from stable. To the contrary, the LAN OS market is changing so dramatically that today's key players, including Novell and Microsoft, are fighting for their lives. Perhaps the strongest force driving this change is the broader architectural shift to a client/server architecture.

The need for basic file and print services is widely understood and implemented in businesses; nevertheless, users are demanding more from their LANs (and the OSs that run them). A client/server architecture, for example, demands more at both ends of the wire: both the server and the client must be smarter and more capable. Viewed another way, the pendulum of user focus is swinging back — the focal point of user interest has shifted from the extremes of the server-centric mainframe era and the desktop-focused PC epoch to a point somewhere in between. The emergence of workgroup applications (like Lotus Notes) and network-capable desktop OSs (like Windows 95) exemplify this trend. Such tools blur the distinction between "desktop" software, like applications and desktop OSs, and "network" software to the extent that users may question what general IS infrastructure, not to mention LAN OSs, their information needs require.

Microsoft is aware that network and desktop software are in this sense converging. In an effort to capitalize on this trend and sell more Windows NT Advanced Servers (NTAS), it is leveraging its Windows (both 3.x and 95) desktop operating systems, its Office application suite, and its software development tools (like Visual Basic) to the hilt. For example, in order for software to be eligible for the Windows 95 logo, it must be written to a specification that makes certain it also runs under Windows NT and thus ensures a wealth of NT applications and developer support.

It should come as no surprise that Microsoft is employing a particularly aggressive strategy to push Windows NTAS. Despite a presence in the LAN OS market for many years, through LAN Manager and now Windows NT, Microsoft has failed to achieve real success. Since the LAN OS market represents the key to the enterprise for Microsoft, this shortcoming is particularly nagging. In order for Microsoft to go to the next level — to move beyond the desktop and into the enterprise — it must steal share from Novell, the LAN OS market leader.

Worldwide PC LAN OS Revenue, 1993–1998

| | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1993–98 CAGR (%) | 1995–98 CAGR (%) |
|---|---|---|---|---|---|---|---|---|
| LAN OSs ($M) | 2,461 | 2,354 | 2,697 | 2,986 | 3,137 | 3,257 | 5.8 | 6.5 |
| % growth | 16 | -4 | 15 | 11 | 5 | 4 | | |

*Source: International Data Corporation, 1995*

Novell is leveraging the directory service functions in NetWare 4.1, highlighting the ability to develop and manage complex distributed network applications. The company's extensive installed base, combined with the mission-critical nature of its networks, will make Novell extremely difficult to overcome under any circumstances. In order for Novell to leverage its distributed network strategy, it must do a better job of getting users to upgrade to NetWare 4.x, something the vendor has been struggling with for years.

Overall, the LAN OS market grew 19% in terms of licenses, but decreased 4% in end-user sales value because of strong pricing pressure and a general transition to lower-priced products. During 1994, 1.0 million PC LAN OS licenses, representing 19.5 million PC nodes, were shipped worldwide. The worldwide dollar value of the licenses shipped in 1994 was $2.3 billion, down from $2.4 billion in 1993. Growth is expected to slow after this year with worldwide revenue expansion falling from 15% in 1995 to 4% by 1998. By 1999, IDC forecasts that 180.0 million PCs (installed) will be running a network operating system and that the dollar value of PC network operating-system shipments will exceed $3.8 billion.

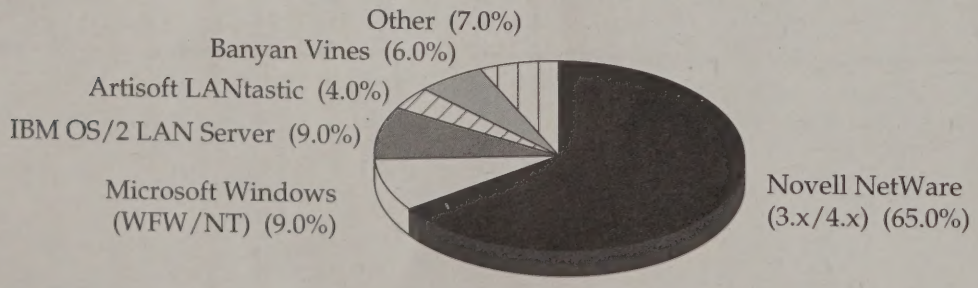
## *Market Shares: No Major Shifts*

In terms of market share, there were no significant shifts in the PC LAN OS segment in 1994. Novell's NetWare continued to account for approximately two-thirds (65.6%) of nodes shipped worldwide. Although NetWare 4.x shipments increased, sales were somewhat disappointing. NetWare 3.x remained Novell's dominant product, while 2.x shipments were minimal.

Microsoft increased its total market share to 9.4% of worldwide 1994 nodes on the basis of increased use of Windows for Workgroups as a peer-to-peer network operating system and sales of Windows NT Advanced Server. Windows NTAS, utilized as a file and print server, totaled 52,000 licenses (5.5% market share). Windows 95 should accelerate the peer-to-peer trend given its ease of use, plug-and-play architecture, and robust network support. In fact, Windows 95's networking may be the product's sleeper feature, as it is a dramatic improvement that is infrequently mentioned.

In 1994, IBM OS/2 LAN Server increased its sales to 92,500 licenses and 1.6 million nodes worldwide (9.1% share). Meanwhile, Artisoft's LANtastic garnered sales of 683,000 nodes worldwide in 1994, earning a 3.5% market share, while Banyan's Vines accounted for 1.9 million nodes, or 6.1% share.

1994 Worldwide PC LAN OS Node Shipments




**Total Shipments = 19,514,286**

*Source: International Data Corporation, 1995*

### Definitions

IDC defines a PC LAN operating system (OS) as software that enables PCs attached to local area networks to communicate with the network server (whether dedicated or nondedicated) and with other PCs on the network. PC LAN OSs must have the following functionality:

- File sharing among the PCs on the network
- File storage and retrieval to and from the file server
- Shared print services on the network

Additional features generally considered by IDC to be part of a PC LAN operating system include the following:

- Ability to run and customize multiuser (network) applications between multiple PCs or between PCs and the server. LAN electronic mail and database management systems are the prime examples of these applications.
- Network administration, directory, management, and security functions.
- Provision for LAN-to-LAN communications and gateways from the PC LAN to other systems (IBM mainframe gateways and remote dial-in).

IDC considers the following products to be PC LAN operating systems: Novell NetWare family (Personal NetWare, NetWare 2.x, 3.x, and 4.x), 3Com 3+ and 3+ Open, IBM PC Network Program, IBM OS/2 LAN Server, Microsoft LAN Manager (OS/2 or Unix), Microsoft Windows NT Advanced Server (NTAS), Microsoft's Windows for Workgroups (if used for peer-to-peer networking), AppleShare, Banyan Vines, Digital's Pathworks, Artisoft LANtastic. In addition, any LAN OS designed around Novell's Portable NetWare, Microsoft's OS/2 LAN Manager, or LAN Manager/Unix are considered PC LAN OSs.

Both 1993 and 1994 figures are actual. Forecasted revenue figures are based on the average sales value of LAN OS products, where the average sales value is the average price the customer pays.

## TCP/IP

Twenty years after its invention, TCP/IP is emerging as the foundation for next-generation networking. Perhaps the most general force driving TCP/IP adoption is the desire of organizations to build tighter links between users and applications through client/server computing. Other related trends that account for the tremendous growth in TCP/IP use include the following:

- Growth in the use of Unix systems in commercial environments
- Increased role of TCP/IP in application development
- Embedding of TCP/IP within leading desktop and server operating systems
- The migration of enterprise networks to TCP/IP

Worldwide PC TCP/IP Forecast, 1993–1999

| | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 1993–99 CAGR (%) |
|---|---|---|---|---|---|---|---|---|
| Shipments | 195 | 338 | 21,922 | 49,412 | 58,749 | 65,458 | 7,082 | 191.2 |
| Growth (%) | | 73.3 | 6,385.8 | 125.4 | 18.9 | 11.4 | 8.2 | |
| Total installed base | 4,642 | 9,541 | 18,717 | 50,033 | 101,949 | 153,128 | 203,287 | 84.4 |
| Growth (%) | | 105.5 | 96.2 | 167.3 | 103.8 | 50.2 | 32.8 | |
| Revenue ($M) | 207.8 | 439.6 | 834.2 | 1,232.5 | 1,512.0 | 1,687.5 | 1,680.0 | 30.8 |
| Growth (%) | | 111.5 | 89.8 | 47.7 | 22.7 | 11.6 | -0.4 | |

*Source: International Data Corporation, 1995*

- Expanded use of TCP/IP networks for remote access
- Broader Internet usage in organizations/World Wide Web mania

## PCs Driving Growth

The largest and most competitive market for TCP/IP products is the PC segment. From revenue of $439.6 million in 1994, the worldwide market for PC-based TCP/IP products will grow to roughly $1.7 billion in 1999. Meanwhile, the worldwide percentage of PCs with TCP/IP will grow from 5.5% in 1994 to 66.1% by 1999 as TCP/IP is embedded in major desktop operating systems (like Windows 95) and firms continue their migration to network-centric computing.

The PC-server platform will emerge as the platform best suited to meet PC clients' demand for enhanced network services. As a result, the worldwide percentage of PC servers with TCP/IP will increase from 18.2% in 1994 to 66.1% in 1999. In their efforts to meet this demand, customers will leverage their desktop operating system expertise by using the related PC server operating system (such as OS/2 or Windows NTAS) and by shopping through the same distribution channels.

## Issues

The administration and management of large networks has migrated from mainframes to network operating systems within PC LANs. In conjunction with this shift, these services are transitioning from single-vendor solutions to more distinct products available from multiple suppliers. TCP/IP-based products exemplify this trend in that today many users are piecing together their own solutions using several products from multiple vendors. Other key issues include:

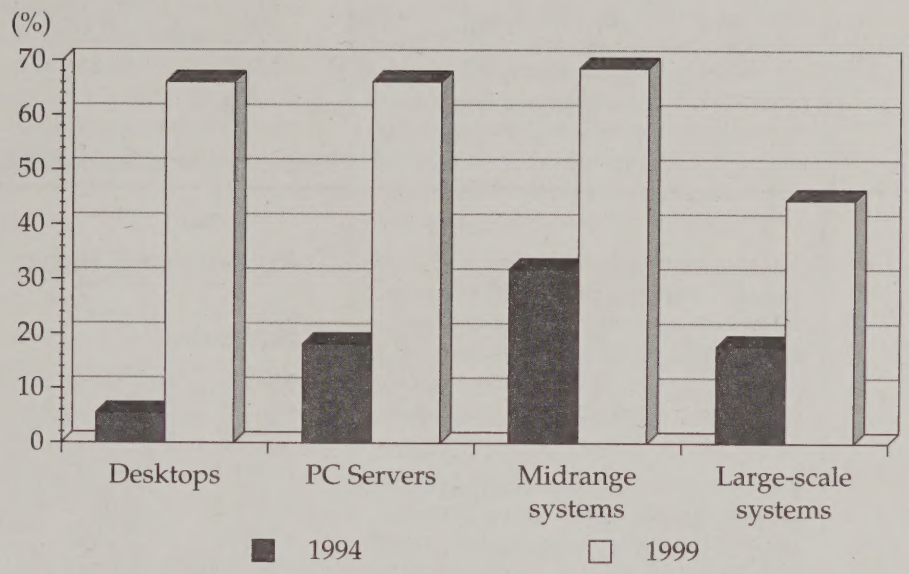
- **Administration** — Currently, the administration of TCP/IP networks is time consuming and difficult. For TCP/IP to continue to grow as a network standard, simpler TCP/IP configuration and management tools are required. The Dynamic Host Configuration Protocol (DHCP), which enables the dynamic allocation of IP addresses, should help in this regard.
- **Security** — Distributed networks, like those based on TCP/IP, require new security controls. Thus far, firewalls have addressed this concern, but ultimately customers will need solutions that ease their ability to maintain a secure a network.
- **Windows 95** — Windows 95, with its integrated 32-bit TCP/IP stack, has upped the ante for vendors in the TCP/IP market. Now more than ever vendors must provide higher-level applications if they want to be included in customers' purchasing plans.
- **Universal client desktops** — Customers are demanding universal clients so that via one bundled package they can connect to multiple types of hosts/servers (IBM mainframe, AS/400, VAX, etc.). As a result, vendors like Attachmate and Wall Data are finding that they now compete with TCP/IP vendors like FTP Software and NetManage. Pricing will fall as single-purpose solutions get squeezed into lower-margin products while at the same time integrated products compete with higher-priced single-use products.

## Recommendations

If TCP/IP is to become the base network standard, vendors must provide a full range of product services (stacks, applications, management tools, security) combined with a strong service and support organization. These services, which were traditionally built into the operating environment, are just emerging in distributed TCP/IP networks.

It is not enough for a TCP/IP vendor to offer narrow solutions such as PC Internet access. In order to be a major player, it must provide a portfolio of server-based offerings such as management, administration, accounting, and security in conjunction with client applications. These pieces should be available separately, but as a package they should give users coherent control of the network.

Worldwide Penetration of TCP/IP into Installed Base by Platform, 1994 and 1999




*Source: International Data Corporation, 1995*

To capitalize on the growing migration to TCP/IP, vendors must articulate a clear strategy to customers and leverage TCP/IP's broad appeal in corporations. In addition, they must provide comprehensive solutions that integrate diverse systems in the enterprise. Customers will base their mission-critical network on TCP/IP and thus will select vendors that are experienced and committed to providing high-level network management, administration, and configuration tools.

### *Definitions*

The Transmission Control Protocol/Internet Protocol (TCP/IP) is actually a set of protocols developed in the early 1970s according to Department of Defense specifications for the communication of systems from multiple vendors. TCP/IP is the standard network protocol for Unix, and a family of applications has evolved on top of it. These include Telnet (terminal access), FTP (file transfer), SMTP (mail), and SNMP (management).

## PC Network Interface Cards (NICs)

The worldwide PC NIC market will continue to grow at least until 1997 although that growth will be driven largely by markets outside the United States. In fact, the NIC market will peak in the United States in 1996. Not only are prices falling, but the market is approaching saturation. From worldwide revenue of $3.7 billion this year, the PC NIC market will peak at $4.2 billion in 1997, after which revenue will steadily decline. Given this outlook, some NIC vendors are diversifying into higher-growth markets. 3COM, for example, is aggressively pursuing opportunities in LAN backbone equipment like hubs, routers, and switches.

To the extent that a market opportunity exists for non-high-speed NICs, it is outside the United States and Western Europe. The Asia/Pacific and Latin America regions are particularly attractive because they are growth markets until nearly the end of the century. More specifically, the Rest of World, or ROW, market (basically, the world, except for the United States and western

Worldwide PC NIC Revenue , 1993–1998

| | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1993–98 CAGR (%) | 1995–98 CAGR (%) |
|---|---|---|---|---|---|---|---|---|
| PC NICs ($M) | 3,330 | 3,414 | 3,671 | 4,089 | 4,173 | 4,095 | 42.2 | 3.7 |
| % growth | 17 | 3 | 8 | 11 | 2 | -2 | | |

*Source: International Data Corporation, 1995*

Europe) for ethernet adapters will grow from 5.1 million units in 1995 to a peak of 9.2 million units in 1998. In 1999, however, shipments will begin to drop off to 8.7 million as the ROW regions start to become saturated, much as the United States will in 1996.

From a NIC technology standpoint, ethernet dominates today, and it will continue to account for the majority of both unit shipments and revenue through 1999. Meanwhile, token ring unit shipments will be flat essentially through 1999, although the value of these shipments will steadily decline as prices fall. Finally, after rivaling token ring from a unit-shipment perspective in 1997, high-speed NIC shipments (like 100Base-T, 100VG AnyLAN, and ATM) will take off, accounting for roughly half as many shipments (and roughly half as much revenue) as ethernet in 1999. Growth in high-speed NICs will be driven by heightened bandwidth requirements for business applications including LAN-based multimedia (like online training and education) and advanced Internet use.

### *Definitions*

IDC forecasts the following network interface card products: ethernet, token ring, 100Base-T, 100VG AnyLAN, FDDI/CDDI, desktop ATM, and wireless LANs. The revenue figures are based on the average street price of a PC LAN adapter multiplied by the weighted shipments by vendor (to ensure that low-volume vendors do not skew the average street price value).

## Routers and Hubs

### *Routers*

The worldwide router market will continue to experience steady growth: from 328,370 units in 1994 to 923,025 units in 1999 (1994–1999 CAGR of 23%). Revenue, however, will grow more slowly than units (9% CAGR 1994–1999) as the low-end segment of the router market booms driven by remote-site connectivity and deeper penetration into midsized and small corporations. The high-end router market will lose unit shipments to LAN switching products in 1997 and 1998, a fate the rest of the router market could share long term.

## Hubs

The LAN hub market is about to reach its prime. The good news is that in 1998 more money will be made on hubs worldwide than ever before. The bad news is that following this peak the market will steadily decline as prices fall (for mainstream ethernet and token ring products), technology matures, and the percentage of PCs connected to LANs reaches saturation. In the United States, the LAN hub market will peak even sooner — in 1996.

From a technology standpoint, sluggishness in the ethernet and token-ring segments will cause the overall market to shrink. High-speed hub sales represent an opportunity, however, since shipments should swell as customers migrate to faster network technology. Thus, to be successful in the U.S. LAN hub market,

vendors must aggressively transition to the high-speed hub offerings (for example, fast ethernet, switched ethernet, and ATM) while also positioning themselves in other growing LAN backbone opportunities (like switches). Regions outside the United States will remain growth markets for several years, even for basic ethernet and token-ring technology.

## Definitions

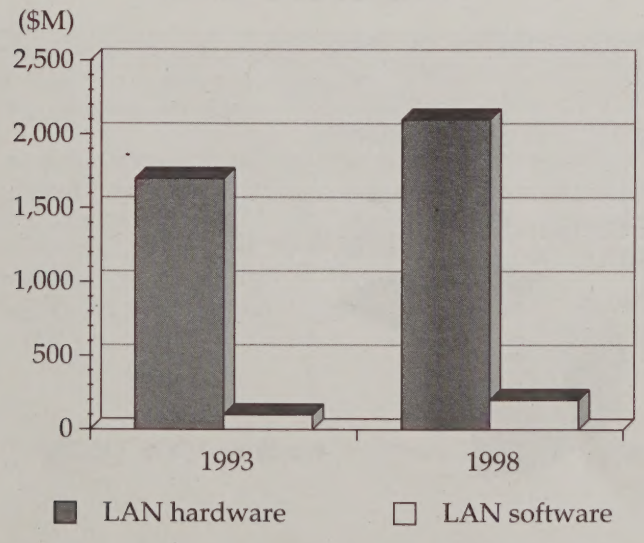
IDC forecasts the following hub products: ethernet and token-ring LAN hubs (chassis, stackable, and unmanaged); network management modules; 100BaseT, 100VG AnyLAN, FDDI/CDDI hubs; workgroup LAN switches (switched ethernet/token ring); and workgroup ATM switches (25/155Mbps). The following products are not included: backbone LAN switches (switched ethernet/token ring/FDDI), backbone LAN ATM switches, router cards in hubs, remote-access cards in hubs, terminal server cards in hubs, file servers in hubs, and network-management software applications.

***The Gray Sheet — Special Edition***

*The Gray Sheet — Special Edition* is a complete analysis of the U.S. computer market from PCs to mainframes, from systems software to systems integration, from Windows 95 to Lotus Notes. It presents and analyzes actual 1994 spending in more than 30 different categories of IT products, including unit and revenue market share in more than 30 tables, figures and graphs.

*The Gray Sheet — Special Edition* also includes IDC's latest forecasts for most IT market segments. In each category IDC applies the fruits of tens of thousands of end-user interviews and forecasts market growth through the end of the decade. In addition, *The Gray Sheet — Special Edition* examines the trends behind the numbers. It provides a concise explanation of the driving forces and inhibiting barriers in every segment of the U.S. IT market. We are extending our special offer to you as *Gray Sheet* subscriber to get the *Special Edition* for $100 off, or just $395, until the end of September. For more information, or to order your copy of *The Gray Sheet — Special Edition*, contact Lisa Bloom at (508) 935-4236.

LAN Hardware vs. LAN Software
U.S. Revenue, 1993 and 1998




Note: LAN hardware includes PC NICs, routers, hubs, backbone switches, and remote-access servers, but *not* servers. LAN software includes LAN OS and TCP/IP.

*Source: International Data Corporation, 1994*

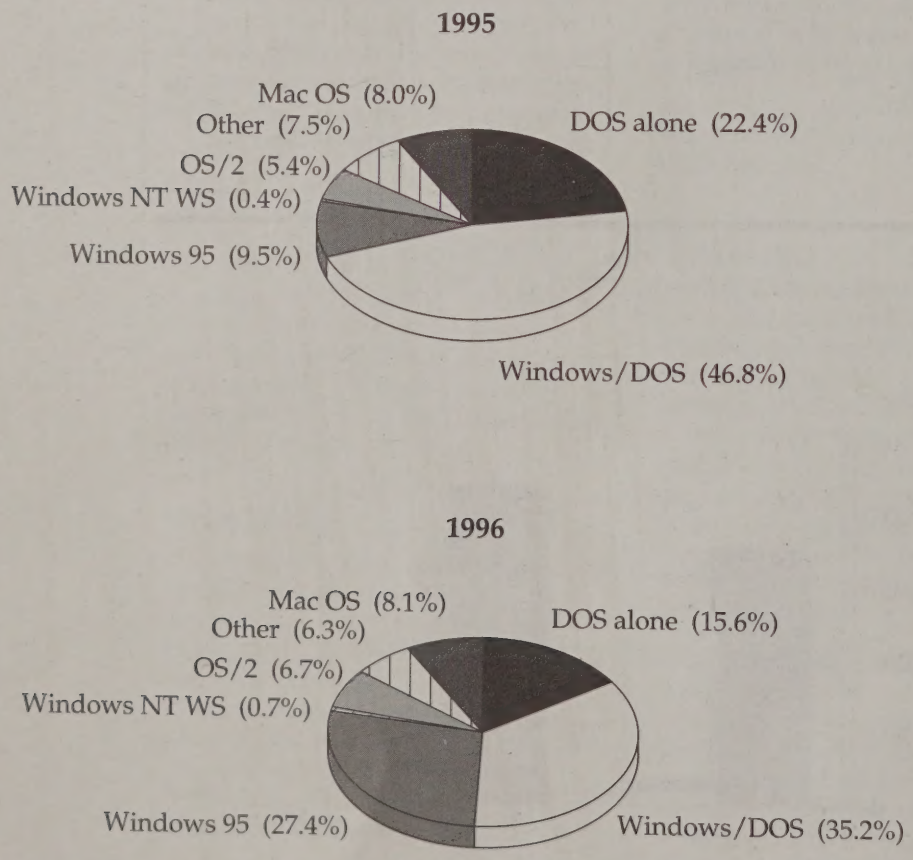
## Microsoft's Strategy: $100/PC/Year

With the launch of Windows 95, Microsoft has defined its OS strategy beyond the earlier "Windows everywhere" campaign to focus on a few specific customer/market segments. Instead of highlighting a questionable effort to put Windows on a multitude of different platforms, Microsoft is focusing on providing a few basic customer segments with compelling operating systems, which it will regularly upgrade. In addition, the vendor's revenue benchmark has come to light: $100 per PC per year.

In the past, Microsoft talked of having Windows on desktops, servers, pen computers, set-top boxes, office equipment, etc. Perhaps someday the software giant will achieve this lofty goal, but today its mainstream OS strategy is far simpler, and includes a mainstream desktop OS (Windows 3.x and 95), a workstation-class OS (Windows NT Workstation), and a server OS (Windows NT Advanced Server).

Windows 95 will extend Microsoft's dominance in mainstream desktop OSs. Even from an installed-base perspective (as opposed to unit shipments), by the end of this year 9.5% of PCs worldwide (nearly 20 million PCs) will already be

Share of Worldwide Installed Base of PCs by OS: 1995 and 1996




*Source: International Data Corporation, 1995*

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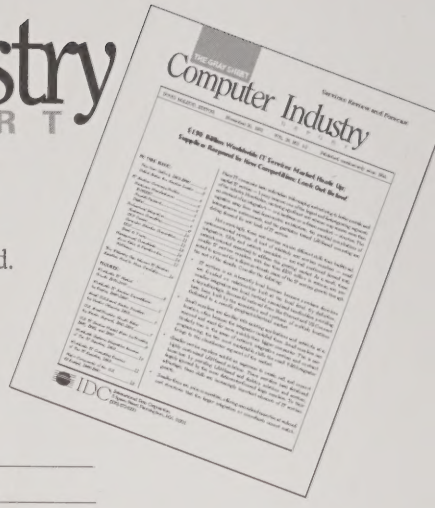


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running Windows 95 (compared to 46.8% for Windows/DOS, 22.4% for DOS only, 8.0% for Mac OS, and 5.4% for OS/2). In 1996, Windows 95's share of the worldwide PC installed base will jump to 27.4%, or 68.5 million units (compared to 35.2% for Windows/DOS, 15.6% for DOS only, 8.1% for Mac OS, and 6.7% for OS/2). The migration in shipments of new systems will, of course, be even more aggressive. In 1996, a whopping 62.7% of the PCs shipped worldwide will run Windows 95.

The workstation and server fronts will be much more difficult as Microsoft faces formidable and entrenched competition. The vendor will make inroads in these arenas, but the level of dominance Microsoft enjoys on the desktop — just over 80% of PC shipments worldwide in 1995 — will wait until the next century, if ever. Not until 1997 will more than a million PCs ship worldwide with Windows NT Workstation (although this will be more than double the 750,000 units in 1996), and even this number will represent a mere 2.4% of total PC shipments. Windows NT Server is having an outstanding year and will triple its worldwide license shipments in 1995 (vs. 1994) to 165,000, thus more than doubling its market share to 13.3% of the market. By comparison, Novell, the market leader, will ship 662,000 licenses of its NetWare products, to gain 53.4% of the worldwide PC LAN OS market. Further gains for NT Server will be steady but much more gradual. In 1999, Microsoft will ship 390,000 Windows NT Server licenses and earn 22.3% of the market, compared to Novell's 845,000 units and 48.3% share.

Over the next few years, Microsoft will need to further segment its OS product line as the market expands and user requirements diverge. By 1999, it will add a distinct consumer OS (leveraging Bob and Windows 95/97) and perhaps even a set-top box OS. At the same time, though, Microsoft expects to merge its workstation-class offering (Windows NT Workstation) with the corporate desktop product (Windows 95 and 97). Segmentation of this sort is wise since home and business PC users' requirements for a desktop operating system are already very different.

In conjunction with these product goals, however, Microsoft also hopes to both increase and flatten its revenue stream. Basically, the vendor aims to get $100 per PC per year from revenues in operating systems, applications, CD-ROMs, etc. For consumers, the goal could go as high as $150 per PC. Since regular and incremental upgrades will play a critical role in achieving this revenue target, Microsoft hopes to get users to upgrade their OS every two years. Given that roughly 76 million PCs will ship worldwide in 1997, should Microsoft achieve just its $100 per system objective by then, the vendor would enjoy calendar 1997 revenues of $7.6 billion on the basis of new PC shipments alone (not counting installed base upgrades). Not bad for a firm with fiscal 1994 revenues of nearly $4.7 billion. (For Microsoft to keep revenues steadily growing at its fiscal 1993/94 growth rate of 24%, the vendor would have to earn nearly $8.9 billion in fiscal 1997.)

Not only do frequent upgrades help Microsoft achieve its $100 goal, however, they also help flatten revenues. For the past few years, Microsoft has in a sense been overly reliant on Windows 3.x for its revenues in that the OS has been the company's cash cow, and it is only now being truly upgraded. If Microsoft can successfully spread its revenues more evenly over a host of products, each with its own upgrade cycles, Microsoft would achieve a more regular and even revenue stream.

## PC Market Outlook Conference

## Tuesday, September 19 — The Red Lion Hotel, San Jose, California

The 1995 PC Market Outlook is a one-day conference sponsored by IDC's Personal Systems Group. The conference provides comprehensive market and technology forecasts, fresh primary research on emerging markets, access to IDC's expert analysts from around the globe, and a forum for discussion about the global computer business.

The PC Market Outlook is an excellent opportunity for anyone to inexpensively acquire a wealth of IDC's latest PC-related data and analysis. In addition, it is a chance to meet with me (Ted Julian, *The Gray Sheet* editor) and other IDC analysts. If you plan to attend, let me know so that we can get together (phone: 508-935-4237; Internet: tjulian@idcresearch.com).

The conference is scheduled to cover the following: the worldwide PC market outlook, consumer brand preferences and buying behavior, Windows 95, PC distribution channels, the future of mobile computing, emerging PC technology, and the PC as the gateway to the information highway.

**To Register**

- Call 1-800-343-4952 (or 508-935-4585) and ask for Dara Queen.
- Or fax your registration to 508-935-4015. Include your name, title, company, address, city, state, zip, phone, and fax.

**Registration fees** (bulk discounts are available for three or more)

- Full registration — $595
- ***The Gray Sheet* subscriber special rate** — $495
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**Payment and Cancellation Policy**

Payment must be received prior to attendance and may be made by check, cash, or credit card (Mastercard/Visa). Cancellations will be accepted until one week prior to the event.

**Location**

The PC Market Outlook Conference will be held at the Red Lion Hotel in San Jose, California (2050 Gateway Place, San Jose, CA 95110, phone: 408-453-4000). Although we reserved sleeping rooms at a reduced rate, they are nearly all taken due to a better-than-expected response for this conference. If you need a room, call the Red Lion immediately and mention the IDC PC Market Outlook Conference for the lower rate (however, we can't guarantee you will get it).

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Computer Industry REPORT

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# The Global PC Market: Less Growth, More Competition . . . How to Compete?

PCs are a fundamental building block for the IT industry. PC consumption drives not only demand for the components that make up a computer, but also a huge spectrum of other products and services. Fortunately, 1994 was another banner year for PCs worldwide. Driven by strong growth in the United States and Asia/Pacific (including Japan), 47 million PCs were shipped in 1994, representing 20.5% growth over 1993. Revenues were even stronger, up 27.5% from 1993 to $93.6 billion. In many regions, demand was fueled by factors that included corporate upgrades, booming consumer demand, and increased portable adoption.

Over the next few years, however, such growth will be difficult to maintain. Consider the following:

- The U.S. corporate PC market is already primarily an upgrade market that provides steady demand as firms regularly turn over their installed base, but it will not fuel significant growth.
- The U.S. home PC market, which has played a major role in providing growth over the past few years, is also problematic. Though PCs have done well selling into upper-income and upper-middle-income homes, achieving comparable penetration into middle-income and lower-middle-income families may prove troublesome — particularly since average system prices have remained relatively stable over the past few years.
- In terms of year-over-year unit shipment growth, the U.S. PC market peaked in 1994, and Western Europe, Asia/Pacific, and Japan will all peak in 1995. The only remaining region, IDC's ROW (rest of world) category, will actually peak in 1996. After reaching these highs, all worldwide regions will slowly decline in unit growth through 1999.

This is not to say that the PC business, and in turn the entire IT industry, is doomed to incremental expansion. Most world regions, including the United States, have a lot of expansion ahead of them. For example, despite slowing growth, PC markets in Asia/Pacific, Japan, ROW, and the United States have 1995–1999 CAGRs of 22.0%, 17.3%, 16.1%, and 12.8%, respectively (as a result, the corresponding worldwide CAGR is 13.9%). Rather, the PC business has simply reached such great proportions that 20%+ growth year after year is no longer feasible for the market as a whole.

October 31, 1995 Vol. 30, No. 17–18

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This issue of *The Gray Sheet* will examine both the recent past and the future of the PC industry in more detail, highlighting the latest U.S. market-share information (including some vendor profiles) and unit and revenue performance by form factor. In addition, this issue will investigate the importance of brand as a key way for PC vendors to create lasting differentiation.

## U.S. PC Market Details

From 1995–1999, growth in the U.S. PC market will gradually slow, both in terms of units and revenue. In 1995, performance will fall slightly from 1994 levels to 22.6 million units (20.9% growth over 1994) and $46.4 billion in revenue (20.0% growth over 1994). By 1999, year-over-year unit growth will hit 10.3%, with 36.5 million shipped, and revenue growth will reach 6.6%, with $67.9 billion earned.

As the slowing growth indicates, the U.S. PC market simply will not be able to maintain 20%+ growth rates. As stated above, the U.S. corporate market is now fueled largely by upgrades, not new business. And, given the long-standing price sweet spot of $1,000 to $2,499 (more on this below) for a new PC, it is difficult to envision further dramatic consumer growth in the States. All is not lost, however. Growth in PC shipments will not be what it was formerly, but the U.S. market will nonetheless turn in a 1995–1999 CAGR of 12.8% and will nearly double from 1994 to 1999.

## The U.S. Vendor Scene

Membership in the top-six club for U.S. PC shipments has been the same for the past three years: Apple, Compaq, Dell, Gateway 2000, IBM, and Packard Bell. Despite this seeming stability, the PC business is far from humdrum as evidenced by the shakeup in this exclusive club in 1994. Compaq grabbed the No. 1 spot last year, vaulting over both IBM and Apple, which had held the No. 2 and No. 1 positions, respectively (both in 1992 and 1993). As a result, Apple was bumped to second place, and IBM actually dropped two spots to number four. Packard Bell, on the basis of astounding year-over-year unit growth (113%!), not only stole the No. 3 position (up from fourth in 1993) from IBM, but significantly closed the gap on Compaq and Apple.

Ninteen ninety-four was also the year that Gateway 2000 rose from sixth place in the United States to clinch the No. 5 position, thus trading places with Dell. Outside the top six, from 1992–1994, Toshiba, Acer, Hewlett-Packard, the now-somewhat-defunct AT&T GIS, and Digital all achieved significant growth. Unit-shipment growth by ZDS and Leading Edge, and to some extent AST, however, was more moderate.

Through the first half of 1995 (according to the latest data available), the U.S. PC vendor rankings look much like 1994. As in 1994, Compaq held the top spot followed by Apple, Packard Bell, IBM, Gateway 2000, and Dell. Hewlett-Packard, however, stole the No. 7 spot from AST, which had been there since 1993.

### Acer

**Strengths:** Solid channel relations (especially outside the United States), impressive new consumer line, strong OEM business.

**Weaknesses:** Limited brand awareness, differentiation challenge.

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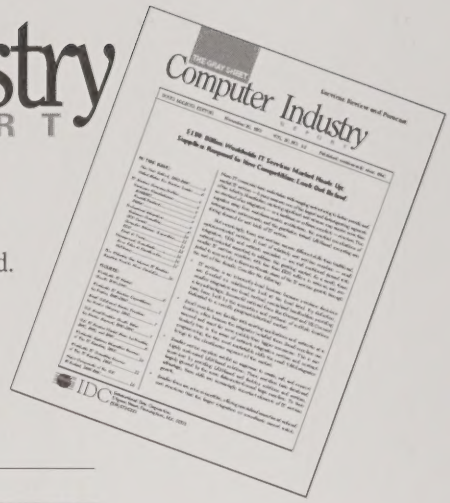
THE GRAY SHEET

# Computer Industry REPORT

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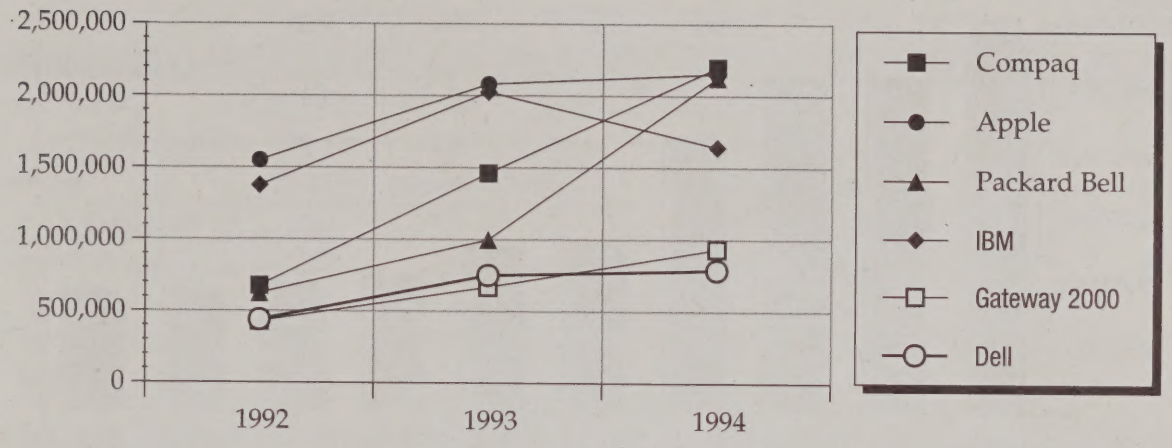
PC Shipments for Top Six U.S. PC Vendors, 1992–1994




*Source: International Data Corporation, 1995*

In fact, Hewlett-Packard will likely prove to be 1995's success story. Back in 1992, HP ranked No. 17 in the United States in terms of U.S. PC unit shipments. In clinching the No. 7 spot in 1H95, HP surpassed not only AST, but also Toshiba and Acer. HP's ascension is all the more remarkable because it is driven almost entirely by the vendor's desktop PCs. The company only recently truly entered the consumer PC segment (in late August with the Pavilion line) and has had limited success with its Omnibook portable line. Thus, HP achieved its rise to stardom without participating in two of the highest-growth PC market segments.

## Apple

**Strengths:** Strong brand awareness and loyalty, consistently an innovator.

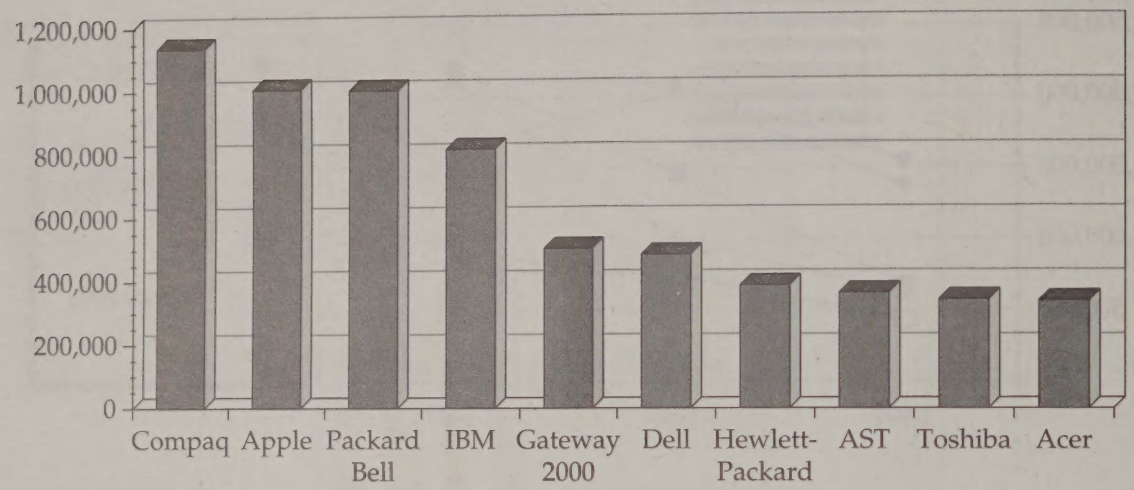
**Weaknesses:** Poor execution (including regular and ongoing inability to meet demand), withering differentiation, concerns over long-term viability.

PC Unit Shipments for U.S. PC Vendors, 1H95

| Vendor | 1H 1995 | % share |
|---|---|---|
| Compaq | 1,136,000 | 11.3 |
| Apple | 1,005,000 | 10.0 |
| Packard Bell | 1,001,000 | 10.0 |
| IBM | 815,000 | 8.1 |
| Gateway 2000 | 502,000 | 5.0 |
| Dell | 482,000 | 4.8 |
| Hewlett-Packard | 385,000 | 3.8 |
| AST | 361,000 | 3.6 |
| Toshiba | 340,000 | 3.4 |
| Acer | 336,000 | 3.3 |
| Other | 3,694,000 | 36.7 |
| US Total | 10,057,000 | 100.0 |

*Source: International Data Corporation, 1995*

PC Shipments for Top Ten U.S. PC Vendors, 1H95




*Source: International Data Corporation, 1995*

## The Worldwide PC Market by Platform

Of the three basic PC platforms (desktops, portables, and servers), portables and servers represent the highest-growth opportunities both in terms of units and revenue. As with the PC market as a whole, all three platform segments are expanding, but growth is slowing.

In the desktop segment, 46.8 million units are expected to ship worldwide this year, and 75.3 million will ship in 1999. Year-over-year growth for desktops will fall from 19.7% in 1995 to 10.4% in 1999; the 1995–1999 CAGR is 12.6%. Portable shipments will double from 9.6 million in 1995 to 19.2 in 1999, and yearly growth rates will peak at 29.2% in 1995 and fall steadily to 15.2% in 1999. As a result, the worldwide 1995–1999 CAGR for portable PCs is 19.0%. Worldwide server shipments are expected to grow from 701,000 in 1995 to 1.7 million by 1999. Year-over-year growth rates will fall from 45.0% in 1995 to 17.5% in 1999, yielding a 1995–1999 CAGR of 24.7%.

From a revenue perspective, the situation is much the same. In 1995, the worldwide value of desktop PC shipments will reach $81.2 billion, with 15.5% year-over-year growth. Thereafter, desktop revenue growth will steadily moderate, reaching $115.6 billion in 1999 based on 7.1% growth. Both portable and server revenue growth will also slow through 1999. Portable revenue will hit $25.1 billion in 1995 based on 27.9% growth. In 1999, $42.6 billion worth of portables will ship based on just 9.5% growth over 1998. Growth in server revenue will peak in 1995 at 45.7% over 1994, hitting $5.2 billion. After 1995, growth in server revenue will decline, hitting 16.8% in 1999 and $12.2 billion.

### AST

**Strengths:** Samsung relationship should bring component, cash, and other resources, broad and established channel relationships.

**Weaknesses:** Losing shelf space and both user and channel mind share, poor execution, growing channel dissatisfaction, losing talent at many levels.

### Compaq

**Strengths:** Significant brand equity, incredibly efficient manufacturing, powerhouse server business.

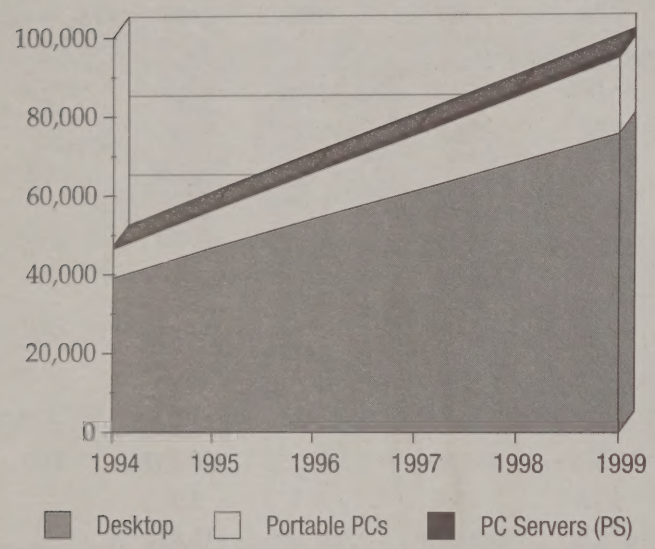
**Weaknesses:** Feeble portable line.

Worldwide PC Market Forecast by Platform, 1994–1999

| | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | CAGR 1995–99 (%) |
|---|---|---|---|---|---|---|---|
| **Unit Shipments (000)** | | | | | | | |
| Total PCs (K) | 47,000 | 57,100 | 66,864 | 76,493 | 86,322 | 96,206 | 13.9 |
| Y/Y % Growth | 24.3 | 20.9 | 15.4 | 13.4 | 12.0 | 10.3 | |
| Desktop | 39,119 | 46,841 | 54,131 | 61,083 | 68,223 | 75,332 | 12.6 |
| Y/Y % Growth | 19.0 | 19.7 | 15.6 | 12.8 | 11.7 | 10.4 | |
| Portable PCs | 7,397 | 9,558 | 11,773 | 14,210 | 16,658 | 19,181 | 19.0 |
| Y/Y % Growth | 26.7 | 29.2 | 23.2 | 20.7 | 17.2 | 15.2 | |
| PC Servers (PS) | 484 | 701 | 961 | 1,201 | 1,441 | 1,693 | 24.7 |
| Y/Y % Growth | 64.6 | 45.0 | 37.0 | 25.0 | 20.0 | 17.5 | |
| **Value of Shipments ($M U.S.)** | | | | | | | |
| Total PCs | 93,552 | 111,542 | 126,721 | 143,835 | 157,352 | 170,439 | 11.2 |
| Y/Y % Growth | 27.5 | 19.2 | 13.6 | 13.5 | 9.4 | 8.3 | |
| Desktop | 70,351 | 81,222 | 89,790 | 100,446 | 107,995 | 115,634 | 9.2 |
| Y/Y % Growth | 24.8 | 15.5 | 10.5 | 11.9 | 7.5 | 7.1 | |
| Portable PCs | 19,615 | 25,096 | 29,836 | 34,573 | 38,917 | 42,614 | 14.2 |
| Y/Y % Growth | 35.5 | 27.9 | 18.9 | 15.9 | 12.6 | 9.5 | |
| PC Servers | 3,586 | 5,224 | 7,095 | 8,815 | 10,441 | 12,191 | 23.6 |
| Y/Y % Growth | 45.3 | 45.7 | 35.8 | 24.3 | 18.4 | 16.8 | |
| **Average System Price ($000 U.S. )** | | | | | | | |
| Total PCs | 1.99 | 1.95 | 1.90 | 1.88 | 1.82 | 1.77 | -2.4 |
| Y/Y % Growth | 5.9 | -1.9 | -3.0 | -0.8 | -3.1 | -2.8 | |
| Desktop | 1.80 | 1.73 | 1.66 | 1.64 | 1.58 | 1.53 | -3.0 |
| Y/Y % Growth | 6.1 | -3.6 | -4.3 | -0.9 | -3.7 | -3.0 | |
| Portable PCs | 2.65 | 2.63 | 2.53 | 2.43 | 2.34 | 2.22 | -4.1 |
| Y/Y % Growth | 1.0 | -1.0 | -3.5 | -4.0 | -4.0 | -4.9 | |
| PC Server | 7.42 | 7.45 | 7.39 | 7.34 | 7.25 | 7.20 | -0.9 |
| Y/Y % Growth | -11.7 | 0.5 | -0.9 | -0.6 | -1.3 | -0.6 | |

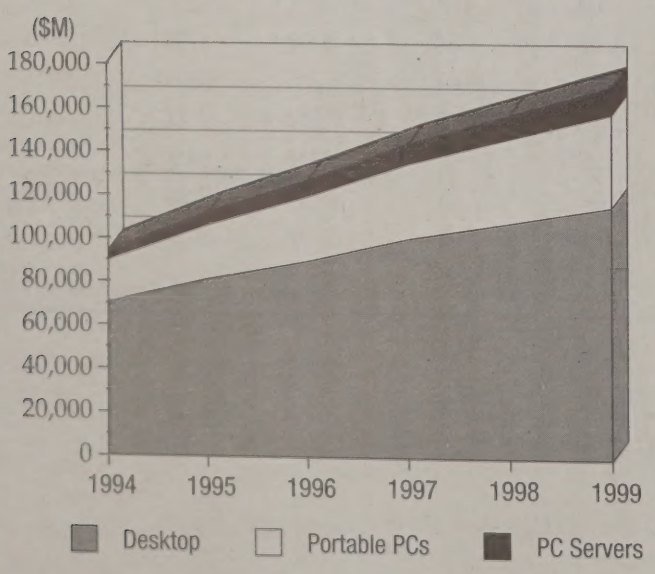
*Source: International Data Corporation, 1995*

Worldwide PC Shipments by Platform, 1994–1999




*Source: International Data Corporation, 1995*

Worldwide PC Revenue by Platform, 1994–1999




*Source: International Data Corporation, 1995*

## Definitions

A **personal computer** is a general-purpose, single-user machine that is microprocessor based, capable of supporting attached peripherals, and can be programmed in a high-level language. These systems typically cost less than $8,000, but higher-priced PCs are included in this category. Specifically excluded from this definition are board-level products used in building embedded systems or upgrading existing PCs. Also excluded are single-user workstations, a category dominated by RISC-based systems from Sun, HP, Digital, and IBM.

## Dell

**Strengths:** Popular notebook line, solid desktops, the corporate direct-response choice.

**Weaknesses:** Virtually nonexistent server business. Can direct-response drive sufficient growth?

## The Differentiation Dilemma

The PC market is perhaps the IT industry's most competitive segment. In the PC business, margins are relatively low, product cycles are short, and mistakes can have quick and brutal repercussions. As with any market, the competitors are constantly trying to differentiate themselves. Historically, many vendors have used price and features as competitive weapons, but these armaments are losing their potency.

Prices have remained relatively flat over the past few years. In the United States, the bulk of PC shipments have occurred in the $1,000 to $2,499 range (average system price including a 14-inch VGA monitor). In fact, volume has heightened in this range over time. In 1991, this range accounted for 60% of unit shipments in the United States, but by 1993 the proportion grew to 79%. Meanwhile, the volume of PCs with average system prices of less than $1,000 has declined from 8% in 1991 to 4% in 1993, and the percentage of PCs with ASPs over $2,499 has declined from 32% in 1991 to 17% in

U.S. Consumer PC Shipments

| | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 |
|---|---|---|---|---|---|---|---|
| Units | 7,563,000 | 9,454,000 | 11,061,000 | 12,499,000 | 13,999,000 | 15,539,000 | 16,937,000 |
| % growth | 26 | 25 | 17 | 13 | 12 | 11 | 9 |

*Source: International Data Corporation, 1995*

1993. (Data for 1994 will be available from IDC's Personal Systems Service in a month or so.) Looking forward, IDC is predicting that on a worldwide basis PC ASPs will decline slightly over time from $1,950 in 1995 to $1,770 in 1999.

Vendors have done an impressive job of cramming more features and functionality into price points, but none have successfully taken pricing to new lows and reaped significant volume. In fact, the landscape is littered with the wreckage of at least a few vendors who tried to break the price barrier — for example, Leading Edge and Pionex. Packard Bell has been the most successful at differentiating on price, but as we've mentioned in *The Gray Sheet* before (see "Home Is Where the PCs Are," Vol. 30, No. 10), and as we will discuss further, PB failed to achieve lasting differentiation. Few new PC buyers enter the store intending to buy Packard Bell, and relatively few existing customers rate themselves as "very likely" to repurchase from Packard Bell. Thus, differentiating on price alone has proven difficult to achieve, and of questionable merit.

A second strategy PC vendors have used to differentiate themselves is using technology and features. In the past, many PC OEMs achieved technical differentiation at the motherboard level. Some vendors designed and built their own motherboards, while others acquired boards on the open market (where they found many to choose from). As a result, PCs from different OEMs varied quite a bit in terms of features, performance, and price.

With the advent of the Pentium chip and the associated PCI bus architecture, Intel has become a dominant force in motherboards. In fact, roughly 50% of Pentium system shipments currently are based on Intel boards. Given that so many systems are now based on the same fundamental building blocks, it is harder for PC vendors to set themselves apart on a feature basis. This trend also makes it harder for PC OEMs to compete on price, because they have less control over system cost.

### Gateway 2000

**Strengths:** Consistent price and technology leader, admirable brand loyalty.

**Weaknesses:** Need to balance cutting-edge technology with support-ability. Can direct response drive sufficient growth?

## The Importance of Brand

For these reasons, perhaps more than ever before, the characteristic that sets PC vendors apart is not so much their ability to create technology, but simply their ability to generate demand for their products. Thus, brand is emerging as a key differentiator. The status of brand has been elevated not only because of the decreased viability of price and technology differentiation but also because of brand's staying power. In the short term, vendors can easily leapfrog one another in terms of performance and price, but brand equity is much less fluid. Furthermore, customers have proven willing to pay more for brand names — all the more attractive given today's depressed margins.

IDG (IDC's parent company), as part of its "Buying IT in the '90s" research series — the most comprehensive continuous study of the purchase process for information technology products in the United States — has conducted two surveys to help technology marketers gain a better understanding of PC product branding.

### Hewlett-Packard

**Strengths:** Vibrant corporate desktop business, excellent channel relationships, solid consumer-line introduction, growing server business.

**Weaknesses:** Limited portable success.

In August/September of 1994, IDG conducted a survey that consisted of a 30-minute telephone interview (followed by a customized disk) of recent PC-product buyers (who were sought out by key PC brands). There were 1,641 respondents, a 67% response rate. Then, in June–August 1995, IDG conducted a similar survey and solicited 1,113 responses. Both surveys addressed desktop PC (as well as portable PCs, application software, and printer).

The study's results indicate that plenty of opportunity exists for PC vendors to improve their brand's pull, as only 13% of respondents indicated that they "want and expect to be faithful" to the brand of PC they own. Thus, a full 87% of those surveyed represent an opportunity for PC firms if and when the respondents buy a replacement or second PC. More specifically, 39% reported themselves to be "strongly committed, not exclusive," 46% indicated "fine, but others also," and 4% said "never again." Since these responses are from people who have already bought a PC, one can assume that responses from individuals who have yet to buy a PC, but intend to, would be even less committad.

### IBM

**Strengths:** Portables strong, huge server potential, virtually unmatched brand recognition.

**Weaknesses:** Poor execution, dwindling customer base, consistently lackluster desktops.

## Today's PC Brand Scene

IBM is testament to the staying power of a strong brand. Despite several years of poor execution at the PC Company, the IBM brand has customer top-of-mind awareness that is without peer. In the 1995 survey, 38% of respondents reported awareness of the IBM brand for desktop PCs. By comparison, Compaq garnered 17% awareness and Apple 13%, while Gateway 2000 and Dell both scored 5%. For home use, where IBM has stumbled over the past year or so, it surprisingly scored even higher, with 44% of respondents reporting top-of-mind awareness.

## Key PC Attributes

Brand awareness is critical because it can be one of the first steps toward a purchase. Once awareness has been generated, however, the challenge is to convert this consideration into intent. To this end, the survey assessed the importance of several product attributes to the purchasing decision. The eight key product attributes surveyed included reliable/bug free, high performance, effective customer service/support, aggressively priced, works well on a network, easy to install and use, widely used/market standard, and feature rich.

Both for home and work use, survey respondents ranked these attributes in the order they were just listed, with

### Business and Home Attribute Importance Is Similar

| Work | | Home | |
|---|---|---|---|
| Reliable, bug free | 3.7 | Reliable, bug free | 3.5 |
| High performance | 2.8 | High performance | 2.8 |
| Effective customer service/support | 2.0 | Effective customer service/support | 2.0 |
| Aggressively priced | 2.0 | Aggressively priced | 1.9 |
| Works well on a network | 1.4 | Works well on a network | 1.9 |
| Easy to install and use | 1.3 | Easy to install and use | 1.3 |
| Widely used/market standard | 1.0 | Widely used/market standard | 1.1 |
| Feature rich | 0.7 | Feature rich | 0.3 |

*Source: IDC's* Buying IT in the '90s Survey, *1995*

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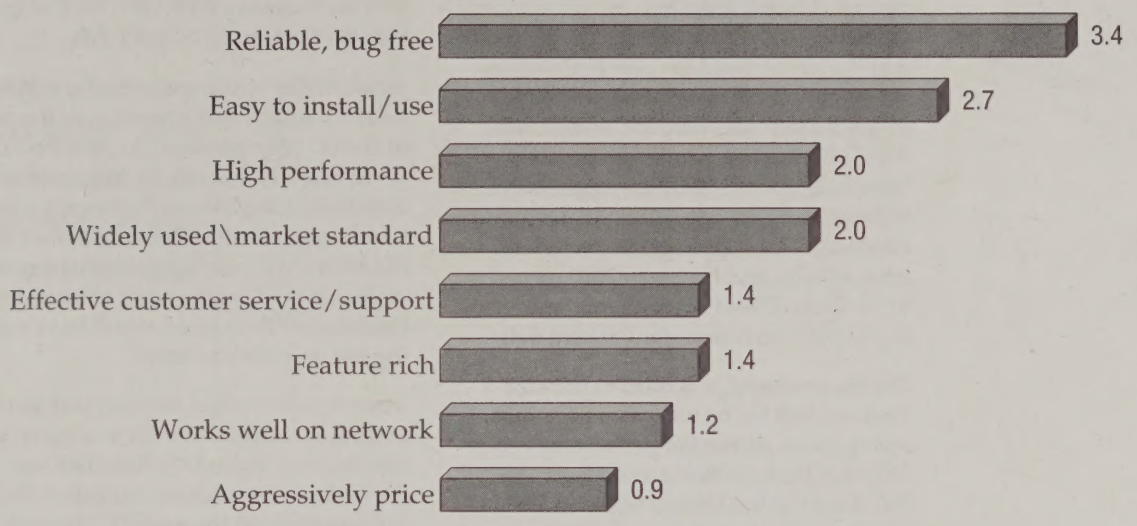
Importance of Product Attribute to Purchase Consideration




*Source: IDC's* Buying IT in the '90s Survey, *1995*

reliable/bug free, high performance, and effective customer service/support taking the top three spots. Easy to install and use, widely used/market standard, and feature rich ranked the lowest.

For portables, respondents ranked easy to install/use and widely used/market standard significantly higher (listed from most to least important: reliable/bug free, easy to install/use, high-performance, widely used/market standard, effective customer service/support, feature rich, works well on a network, aggressively priced). The enhanced importance of the easy to install/use and widely used/market standard attributes is likely a result of the relative diversity of portable features and functions; with so much to choose from, users want to make the right choice. Meanwhile, aggressively priced fell four notches to last place, affirming that much greater price elasticity can be found in the portable market.

Survey respondents were also asked to select the vendor most closely associated with the key attributes. Compaq was rated high for reliable/bug free, high performance, and effective customer service/support. Gateway 2000 and Dell, meanwhile, were rated similarly, scoring high in the aggressively priced, effective customer service/support, and high-performance categories. While Gateway scored significantly higher than Dell for being aggressively priced, Dell surpassed Gateway for effective customer service/support and high performance.

Compaq's high rating on the attributes that respondents ranked as the most important serves as evidence of the linkage between attribute and market performance. Except for the high-performance category, where vendors tend to leapfrog one another regularly, the ratings for Compaq, Dell, and Gateway 2000 are otherwise in line both with the market reality and the vendors' marketing messages. Compaq for the past year or two has been purposefully focused on cost and ease of ownership issues. Dell and Gateway 2000 both try to be value leaders that give customers a lot for their money. And while Dell is trying to put together a better cost of ownership story, much work remains to be done.

## Packard Bell

**Strengths:** Retail superstar, price and technology leader.

**Weaknesses:** Limited brand equity, lack of portable and corporate presence, highly leveraged despite outside investments.

Strong attribute performance does more than simply influence buyers to select your brand; it makes them willing to pay more. By and large, PC firms that have distinguished themselves by consistently delivering on various attributes can command a price premium. The IDG survey asked customers about their willingness to pay a price premium for several vendors' offerings vs. similarly featured brands. Respondents rated Apple No. 1, followed by Compaq, IBM, HP, Dell, and Gateway 2000 (Apple garnered 64% of respondents, and Gateway 2000 earned 41%). Only 32% of respondents were willing to pay a premium for Packard Bell.

On the one hand, it is hard to criticize Packard Bell for its low price premium rating given its market performance. Not only has Packard Bell grown from the No. 4 spot in the United States in 1993 to No. 3 in 1994, but in doing so it has closed the gap between itself and the top players from about 1,000,000 units a year to less than 100,000. On the other hand, can price and channel strategies alone carry Packard Bell over the long run? Even if they could, are they the wisest courses of action?

It is not surprising that Packard Bell gets these ratings. After all, most (if not all) of this vendor's marketing efforts are focused on generating co-op advertising — that is, working with retailers to ensure Packard Bell systems are prominently featured in advertising collateral like newsprint circulars. Even if the company has attribute/brand messages to send, it hasn't really created any channels to communicate these messages. Packard Bell is largely relegated to someone else's sales pitch, not its own. As a result, customers aren't left with a strong feeling for why they should always buy Packard Bell.

### Toshiba

**Strengths:** Solid retail presence (the "Packard Bell of portables"), strong product lineup.

**Weaknesses:** Need to refresh high end, portables alone may not be able to fuel sufficient growth.

Thus, although Packard Bell has grown impressively, it has failed to achieve significant brand equity. IDC's *Global Home Market Survey* (see *The Gray Sheet*, Vol. 30, No. 10) indicates that relatively few PC customers enter stores intending to buy Packard Bell PCs. And, according to the IDG survey, only 39% of those who purchase Packard Bell systems consider themselves likely to repurchase a Packard Bell (vs. 70% for Apple and HP, 69% for Gateway 2000, 66% for Compaq, 65% for Dell, and 51% for IBM).

In short, this weakness in brand equity makes Packard Bell's position in the top of the PC pack tenuous. At best, because it has failed to create a strong sense of brand, Packard Bell can't charge a price premium and thus is leaving money on the table. At worst, once another vendor cracks its hold on the retail channel and challenges PB on price, it will have nothing left on which to stand.

Many vendors target Packard Bell as a vendor to emulate in order to achieve success in retail. Indeed, Packard Bell has learned a lot through its dedication to (if not invention of) the retail PC channel, and vendors are wise to try to learn through Packard Bell's example. However, its greatest shortcoming — failure to establish lasting brand equity — may prove to be its Achilles heel and is the weakness other vendors should seek to exploit.

## Less Growth, More Competition: How to Compete?

The PC business is already brutally competitive. Unfortunately, as growth in the overall market slows, it will probably get even more cutthroat. To the extent that price and (to an even greater extent) technology still have any potency as competitive armaments, it is largely in the notebook and server segments where vendors have more control over these factors. The result of this decline in all of the PC market segments — and especially in desktops — is that brand is emerging as the most powerful competitive force. After all, brand recognition frequently initiates the sales process. If this recognition is bolstered by compelling messages that focus on attribute performance, not only is a purchase more likely to result, but the purchase can command a premium price.

*For more information on IDG's "Buying I.T. in the '90s" research series, contact Scott Kleinman at 415-676-3021 or Internet: scott_kleinman@idg.com*

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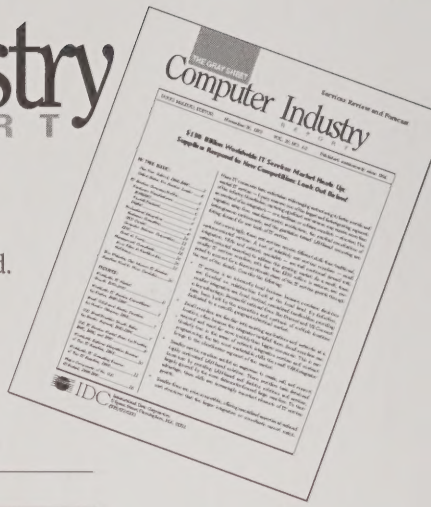


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Volume 30, Number 17–18

## *The Gray Sheet* — Product Page

With this issue of *The Gray Sheet*, we are trying out an idea we've had for some time — a product review — *Gray Sheet* style. The concept is that in each issue of *The Gray Sheet* we will review a product, preferably from the market that the issue covers. Instead of the performance comparisons you find in most other reviews, the focus of the Product Page will be on IDC's market expectations and analysis.

Thus, Product Page reviews would go a step beyond mere positive or negative impressions and benchmarks and into real market potential. For example, it is one thing for a trade magazine to say that IBM's new notebook is head and shoulders above the competition and should fare well. But it is another to then say — as the Product Page will — that the notebook market is expected to grow by x% and that the product's particular portion is expected to grow by y%, and then discuss key market trends and challenges and how the product addresses them.

Please let me know what you think of the Product Page, both as a concept and as implemented in this issue (you can call me, Ted Julian, *The Gray Sheet* editor, at 508-935-4237, or contact me via e-mail at *tjulian@idcresearch.com).*

# Product Page

## Hewlett-Packard's Pavilion PC

In conjunction with Microsoft's rollout of Windows 95 in late August, HP unveiled its Windows 95-based Pavilion desktop PC line. Targeted at retail PC buyers, the Pavilion launch actually followed a five-month test of the retail PC business in which HP sold a limited line of Intel-built systems exclusively through Circuit City. With its Pavilion line, however, HP has entered the home PC market for real, and in impressive fashion. HP has aptly emulated the successes of others with its first-generation consumer PC and has added a few twists of its own.

Perhaps most striking about the HP Pavilion is its industrial design (courtesy of Lunar Design). Instead of the usual beige, the Pavilion case is light gray and bulbous, with many sleek curves. (The Pavilion and Acer's new Aspire line look to be "this year's model(s)" and the most striking PCs available in retail during this year's holiday buying season.)

HP's Pavilion line (which is built by SCI Systems in Alabama) comes in both 486 (AMD DX4/100) and Pentium (75, 90, and 100) configurations, spanning desktop (the 5000 series) and minitower (the 7000 series) chassis. The AMD 486 model is based on an Acer motherboard. The Pentium configurations use an Intel motherboard with the Triton PCI chipset.

*The Gray Sheet* reviewed the Pentium/100-based Pavilion 7050 with 256KB of secondary cache, 16MB of RAM, 4X Mitsumi CD-ROM drive, 1.260GB hard drive, 3.5-inch floppy drive, 32-bit PCI-based, S3 Trio 32 graphics controller with 1MB DRAM, 16-bit sound based on Crystal's CS4232 chipset, Altec Lansing speakers (1.3 watts per channel), a 14.4Kbps Prometheus Zephyr fax modem, and the following software: Windows 95, HP Personal Page shell, MS-Works for Windows 95, EasyPhoto, Quicken SE, HP Financial Calculator, MS-Encarta 95, MS-Bookshelf 95, Memphis Math, MS-Explorapedia, MS-Entertainment Packs 2 and 4, MS-Home CD Sampler, MS-SoundBits Hollywood, America Online, CompuServe, WinCim, Prodigy, HP FAXPhone, and First Aid Recovery Kit. As this issue went to print, IDC's PC Pricing Program pegged the street price for the Pavilion 7050 at $2,099 (without monitor).

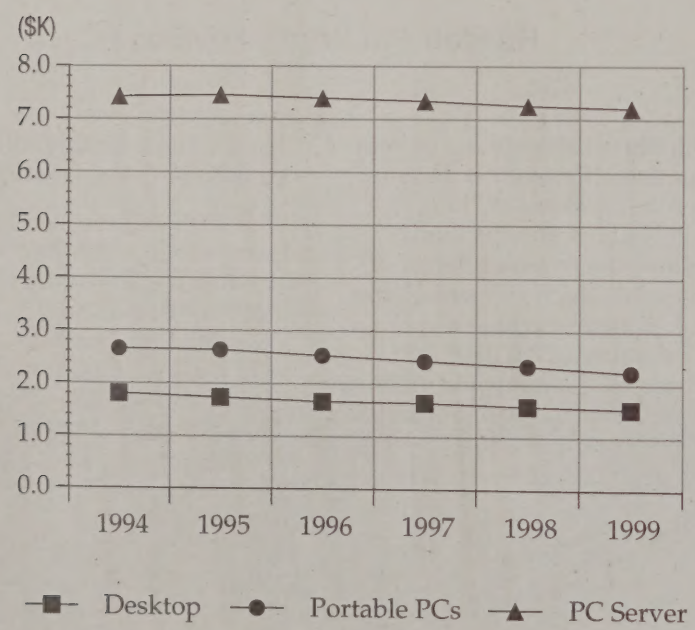
As with several other home PC vendors, to ease the "out-of-box experience," HP's Pavilion includes a large setup poster at the top of the box with step-by-step instructions, color-coded cables and connectors to ease setup, a Windows "shell" for novice users, and extensive online

documentation (using "virtual manual" software from Phoenix). The Pavilion monitor not only includes speaker jacks and an integrated microphone, but a single cable that connects these devices to the CPU from the back of the monitor.

According to IDC/Link, based on 26% year-over-year growth the consumer PC market hit 7.6 million units in the United States in 1994. While the U.S. market will not be able to sustain such heady growth going forward, another 25% growth is nonetheless expected in 1995 (to 9.5 million units) after which year-over-year unit growth will slow, hitting 11% in 1999 (15.5 million units).

Given this growth, it is unfortunate that HP missed out on last year's boom in consumer PCs. HP is nothing if not conservative, however, as its trial earlier this year in retail indicates. Even this year, though, HP's upside with the Pavilion is limited in that the vendor has contracted with SCI for only 250,000 units. The vendor could easily sell all of these: although the Pavilion lacks some of this year's hottest features (like 28.8Kbps modems and MPEG video), it is nonetheless impressive, especially for a first-generation product.

Worldwide PC ASPs by Platform, 1994–1999 ($000 U.S.)




*Source: International Data Corporation, 1995*

THE GRAY SHEET
Computer Industry
REPORT

*Global market intelligence on the information technology industry since 1964.*

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# The Worldwide Software Market — The Importance of Client/Server

If a universal top-level trend can be found in the incredibly diverse segments that make up the software market, it is probably the importance of open-solution and system-management capabilities. More than ever, customers are demanding the ability to share and manage assets across their existing enterprises, whether spreadsheet data on a notebook PC or transaction information on a mainframe. And, although it is unlikely that IS departments will be managing Windows PCs from their mainframes anytime soon, they are definitely trying to establish management tools and procedures that are as all-encompassing as possible. As networks expand, companies reengineer themselves, and collaborative computing begins to take hold, software solutions — whether they are applications, tools, utilities, or operating systems — must fit into the enterprise environment.

While the total software market is made up of a multitude of dynamic segments, the overall market will be remarkably stable. Worldwide total software revenues will grow steadily through 1999 with consistent year-over-year revenue expansion of 13–14%. From a base of $79.5 billion in 1994, the global software market will grow to $150.1 billion in 1999. Of the three primary software markets — application solutions, system-level software, and application-development tools — application solutions is the largest in terms of U.S. revenues and will remain so through 1999. Application-development tools, however, is the fastest-growing segment with worldwide revenue growth of 15–16% through 1999.

This issue of *The Gray Sheet* will examine the three primary segments of the broader software market in more detail. In particular, it will highlight IDC's latest data and thinking on PC operating systems (OS). Then, given the far-reaching importance of the client/server architecture to the software market, not to mention the IT market as a whole, this issue will provide a framework for understanding client/server's past and future.

November 30, 1995 Vol. 30, No. 19-20

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Worldwide Software Revenue by Primary Market ($M)

| | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 |
|---|---|---|---|---|---|---|
| Solutions | 34,930 | 39,582 | 44,781 | 50,707 | 57,403 | 65,005 |
| System SW | 21,922 | 24,540 | 27,453 | 30,673 | 34,281 | 38,359 |
| Tools | 22,598 | 26,087 | 30,140 | 34,759 | 40,203 | 46,774 |
| Total | 79,450 | 90,209 | 102,374 | 116,139 | 131,887 | 150,138 |

*Source: International Data Corporation, 1995*

## Application Solutions

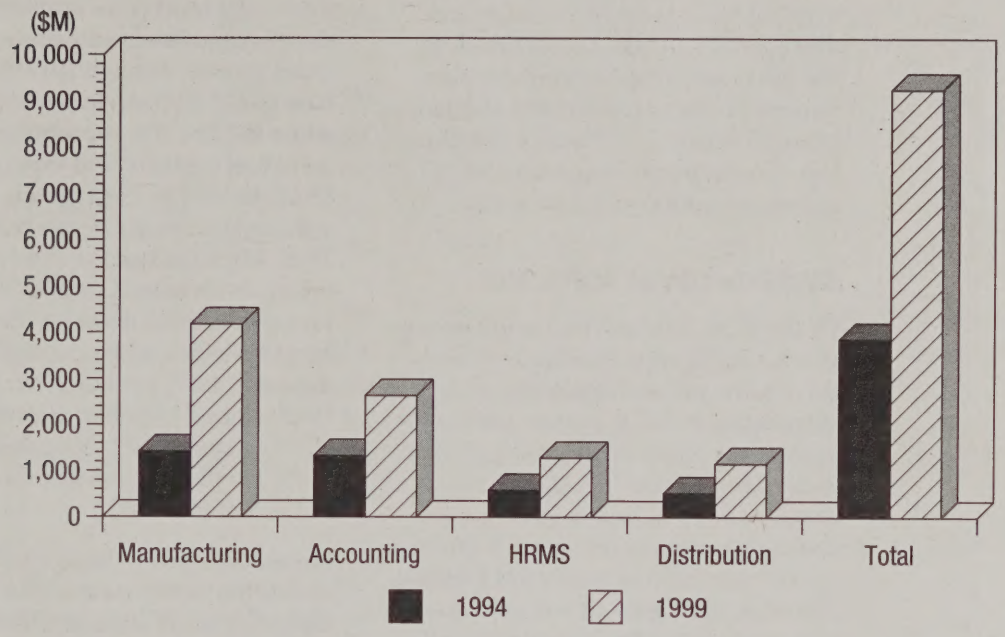
Client/server applications are driving much of the growth in the software application-solution market. In fact, in IDC's *1995 Global IT Survey*, more than 60% of worldwide respondents said they are moving or planning to move to client/server technology — a steady increase from just 34% in 1991. So far, client/server business has been somewhat vertical in that specific functions like accounting have been targeted, and new products and business have sprung up around these functions. To be fair, new functions are being automated with client/server technology today, and more will emerge in the future. However, for client/server to fulfill its promise, these functions must be tied together to enable cross-department automation. Such larger-scale client/server applications are where the real money is since most individual functions are not a sizable enough opportunity as packaged software products.

The outlook for worldwide application-solution software revenue through 1999 is for significant, although flat, growth. From 1995 through 1999, revenue will grow steadily at just over 13% per year, from $39.6 billion in 1995 to $65.0 billion in 1999. Although today client/server applications account for only a small percentage of these revenues, such applications are where most growth is. In this sense, client/server represents the rebirth of the application-solution segment because it will rejuvenate expansion.

Initial applications that have generated client/server application demand include workgroup computing, workflow automation, and supply-chain automation. However, as both vendors and users have migrated legacy production code to target these applications, they have discovered new associated applications. For example, client/server accounting vendors offering basic general ledger, accounts payable, and/or fixed-asset applications are increasingly competing on value-added functions such as budget-process automation, reporting, and workflow.

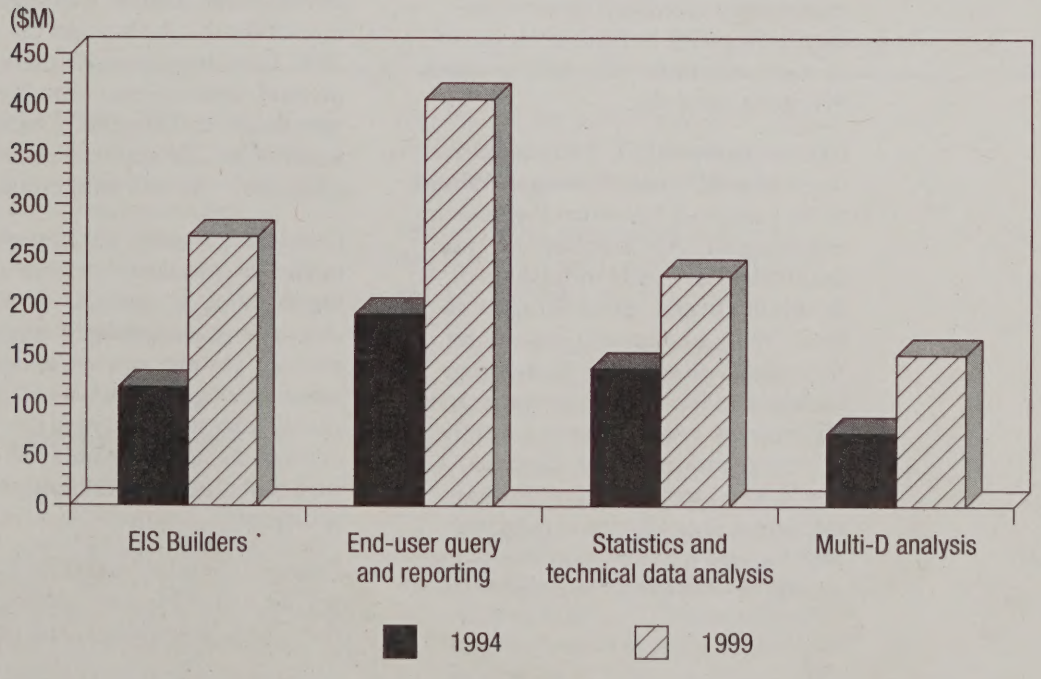
As vendors and customers move to provide large-scale cross-department applications, they are evaluating departments that traditionally have been underautomated, like customer service, sales, and marketing. In the near future, these functions will become important functions to address.

U.S. Selected Enterprise-Application Packaged Software Revenue by Secondary Market, 1994 and 1999




*Source: International Data Corporation, 1995*

U.S. Selected Information-Access-Tool Packaged Software Revenue by Secondary Market, 1994 and 1999




*Source: International Data Corporation, 1995*

Toward the end of the century, object and intelligent-agent technologies will increasingly become the basis for providing innovative solutions to long-existing business problems. Objects and agents will take client/server to the next level, empowering decision makers across organizations and facilitating efficient and effective collaboration among people regardless of physical location and time zones.

## System-Level Software

Of the three fundamental software segments (application solutions, system-level software, and application-development tools), system-level software is the smallest and will grow the most slowly. From worldwide revenues of $21.9 billion in 1994, the system-level software market will grow by 11.9% in 1995 to nearly $24.5 billion. Through 1999, growth will continue at this nearly 12% clip, hitting $38.4 billion in 1999.

The key to success for several traditional system software vendors is to smoothly transition their mainframe product lines to less expensive and more open solutions. Next-generation products will be running in and managing more diverse environments; in order to fund their development, vendors will need to watch revenues carefully.

Open-system and PC-LAN-oriented firms face different challenges. Whereas they are well known at the desktop and in small LAN installations, they frequently have little mindshare or credibility in enterprise IS organizations. Their success will depend on their ability to convince IS that they understand the rigorous requirements for business-critical systems and then to deliver products that fill these needs. The increased importance of middleware as a way to bridge the desktop and network portions of the enterprise will exacerbate these issues.

## Application-Development Tools

Of the three fundamental software segments, the market for application-development tools will enjoy the most rapid growth through 1999. From a base of $22.6 billion in worldwide revenues in 1994, the application-development tool segment will expand by 15.4% in 1995 to $26.1 billion. Growth will continue to accelerate through 1999, when the market will reach $46.8 billion in revenue. Continued penetration of relational database management systems and their associated database tools, as well as the availability of various tools that address client/server needs (3GL, 4GL, and CASE), will drive most of the growth in the tool market.

Since development tools ultimately enable the steady pace of change that embodies the IT industry, the tool market can seem a blur. In fact, the tool market is undergoing change on several fronts. In terms of development methods, client/server has moved beyond mere hype to concrete reality, and even object-oriented development tools are becoming mainstream. Meanwhile, software components remain an emerging development method that should impact the market beyond the year 2000. In conjunction with these shifts in method, tools are also evolving to serve new theaters of execution, including the Internet, mobile applications, and heterogeneous server configurations.

Faced with increasingly complicated environments, developers are demanding that tools be easier to use and that they better manage the development process. Testing, version, and configuration management tools will gain popularity, and team-oriented development environments (complete with repositories) will replace standalone developer solutions.

Demand for relational DBMS products will be fueled by users' ongoing need to capture, manipulate, and maintain

Worldwide Shipments and Market Share of New PCs by Operating System, 1993–1999

| | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | CAGR (%) 1994–99 |
|---|---|---|---|---|---|---|---|---|
| **Shipments** | | | | | | | | |
| DOS alone | 9,310 | 7,810 | 5,710 | 5,380 | 4,580 | 3,910 | 3,010 | -17.4 |
| Windows/DOS | 22,570 | 32,620 | 24,660 | 5,780 | 3,010 | 1,210 | – | -100 |
| Windows 95 | – | – | 15,700 | 41,600 | 50,860 | 59,210 | 68,490 | NA |
| Windows NT Workstation | 70 | 140 | 460 | 750 | 1,820 | 3,110 | 3,850 | 94.0 |
| OS/2 | 1,440 | 2,060 | 3,850 | 4,750 | 5,580 | 6,250 | 6,990 | 27.7 |
| Other (Unix and multiuser) | 1,320 | 1,580 | 1,900 | 2,280 | 2,690 | 3,210 | 3,500 | 17.2 |
| Subtotal Intel (incl. piracy) | 34,710 | 44,210 | 52,280 | 60,540 | 68,540 | 76,900 | 85,840 | 14.2 |
| Mac OS | 3,660 | 3,940 | 4,730 | 5,560 | 6,610 | 7,480 | 8,530 | 16.7 |
| Other | 650 | 350 | 350 | 300 | 650 | 900 | 1,150 | 26.9 |
| Total PC shipments | 39,020 | 48,500 | 57,360 | 66,400 | 75,800 | 85,280 | 95,520 | 14.5 |
| **Share (%)** | | | | | | | | |
| DOS alone | 23.9 | 16.1 | 10.0 | 8.1 | 6.0 | 4.6 | 3.2 | |
| Windows/DOS | 57.8 | 67.3 | 43.0 | 8.7 | 4.0 | 1.4 | 0.0 | |
| Windows 95 | 0.0 | 0.0 | 27.4 | 62.7 | 67.1 | 69.4 | 71.7 | |
| Windows NT Workstation | 0.2 | 0.3 | 0.8 | 1.1 | 2.4 | 3.6 | 4.0 | |
| OS/2 | 3.7 | 4.2 | 6.7 | 7.2 | 7.4 | 7.3 | 7.3 | |
| Other (Unix and multiuser) | 3.4 | 3.3 | 3.3 | 3.4 | 3.5 | 3.8 | 3.7 | |
| Subtotal Intel (incl. piracy) | 89.0 | 91.2 | 91.1 | 91.2 | 90.4 | 90.2 | 89.9 | |
| Mac OS | 9.4 | 8.1 | 8.2 | 8.4 | 8.7 | 8.8 | 8.9 | |
| Other | 1.7 | 0.7 | 0.6 | 0.5 | 0.9 | 1.1 | 1.2 | |
| **Total PC shipments** | 39,020 | 48,500 | 57,360 | 66,400 | 75,800 | 85,280 | 95,520 | |

*Source: International Data Corporation, 1995*

heterogeneous data. Meanwhile, 4GL and GUI-oriented 3GL products will continue to prosper as they still quickly and clearly present data to end users. However, 3GLs that do not address reuse will lose share to object-oriented languages and visual tools that offer rapid application-development advantages.

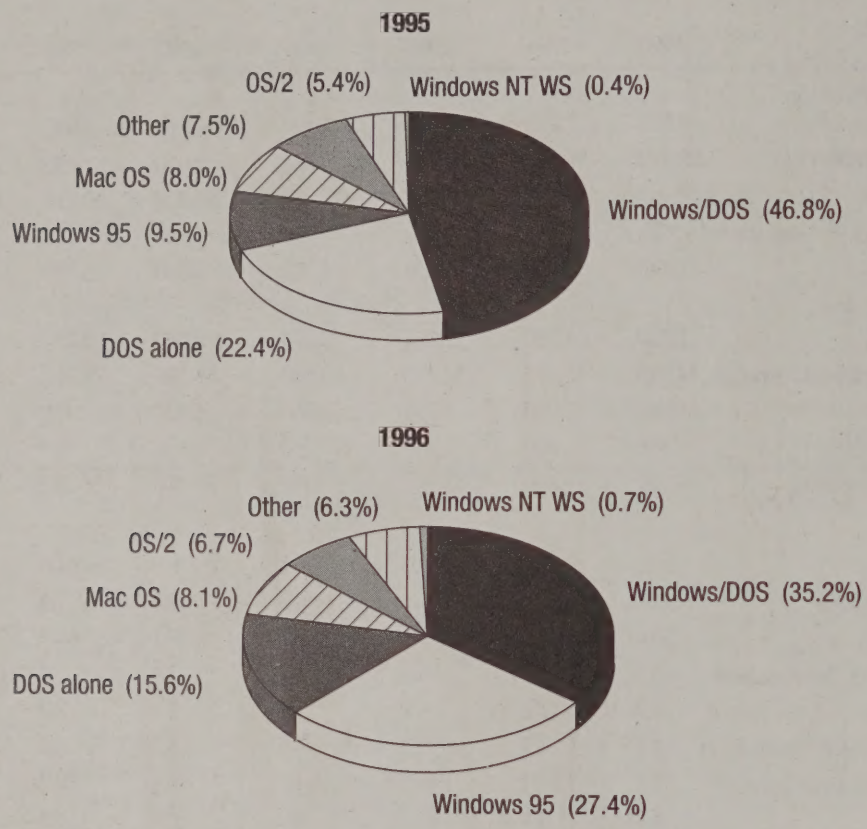
## PC Operating Systems

Volumes in the PC operating-system market are strongly tied to PC shipments. In fact, IDC's analysts in its PC and Consumer Software Program this year began to focus on tracking PCs by operating system rather than by the total number of OS licenses shipped. As a result, much of their analysis is focused on the percentage of PC shipments that various OSs capture as opposed to total license shipments .

In case doubt remains concerning Microsoft's dominance of the PC OS market, consider the following:

- From an impressive base of accounting for 71.2% of worldwide PC shipments in 1995, by 1999 Microsoft's desktop OSs (Windows/DOS, Windows 95, and Windows NT Workstation) will garner 75.7% of shipments.
- Thanks to its aggressive Warp rollout, IBM's OS/2 jumped from a 4.2% share of worldwide PC shipments in 1994 to 6.7% in 1995. In 1997, OS/2 will peak at 7.4% of

Worldwide PC Market by OS, Installed Base, 1995 and 1996




*Source: International Data Corporation, 1995*

global PC units, after which it will hold at 7.3% for 1998 and 1999.

- Apple's Mac OS actually peaked in 1993 when it earned 9.4% of the worldwide PC market. In 1995, the Mac OS will recover from its 1994 low of 8.1% of global PC units to account for 8.2%, after which its share will steadily grow to 8.9% in 1999.

## Windows 95

Microsoft will have shipped nearly 20 million Windows 95 licenses in 1995; 15.7 million will be new PCs, and 4.2 million will be upgrades. Cast in this light, it is hard to view Microsoft's Windows 95 rollout as anything but a success. However, to fulfill the product's true promise and keep Microsoft's revenues growing, Microsoft must not only gain new customers, but get existing users to upgrade, particularly since Windows 95 is the successor to Windows 3.x and there will be no DOS 7. In this regard, the vendor faces moderate challenges in corporate and home upgrades, not to mention in application upgrades.

Based on survey results, we expect major corporate upgrades to wait until Q1/Q2 of 1996. Much of this upgrade will be tied to the purchase of new systems. Corporate application upgrades will be more difficult, even though many of Windows 95's perceived benefits (like improved multitasking) virtually require 32-bit applications. Ironically, IDC's cost- and value-to-use

U.S. Shipments and Market Share of New Intel PCs by Operating System, 1993–1999

| | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 |
|---|---|---|---|---|---|---|---|
| **Share of New Intel PC Shipments (%)** | | | | | | | |
| DOS alone | 27.0 | 16.9 | 8.6 | 6.0 | 5.0 | 4.0 | 3.0 |
| Windows/DOS | 68.7 | 78.0 | 48.0 | 9.8 | 4.7 | 0.0 | 0.0 |
| Windows 95 | 0.0 | 0.0 | 35.0 | 75.0 | 79.5 | 83.8 | 84.5 |
| Windows NT Workstation | 0.3 | 0.6 | 1.4 | 1.7 | 3.3 | 4.7 | 5.0 |
| OS/2 | 4.0 | 4.5 | 7.0 | 7.5 | 7.5 | 7.5 | 7.5 |
| Total (incl. piracy) | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Win3.x and Windows 95 | 68.7 | 78.0 | 83.0 | 84.8 | 84.2 | 83.8 | 84.5 |
| Win16 and 32 | 69.0 | 78.6 | 84.4 | 86.5 | 87.5 | 88.5 | 89.5 |
| **New Intel PC Shipments (000)** | | | | | | | |
| DOS alone | 3,308 | 2,576 | 1,570 | 1,229 | 1,156 | 1,019 | 838 |
| Windows/DOS | 8,418 | 11,887 | 8,765 | 2,007 | 1,086 | – | – |
| Windows 95 | – | – | 6,391 | 15,361 | 18,373 | 21,347 | 23,600 |
| Windows NT Workstation | 42 | 90 | 263 | 357 | 751 | 1,185 | 1,396 |
| OS/2 | 490 | 686 | 1,278 | 1,536 | 1,733 | 1,911 | 2,095 |
| Total (incl. piracy) | 12,259 | 15,238 | 18,268 | 20,490 | 23,100 | 25,461 | 27,929 |

Unix and servers not included in data.
*Source: International Data Corporation, 1995*

analysis indicates that Office 4.x sites can pay back the cost of a combined Windows 95/Office 95 upgrade in less than a year and benefit from more subjectively measured productivity improvements that could justify a five-month payback.

On the home front, although new systems are a cinch, upgrades are complicated by the fact that, historically, home users don't upgrade anything — not hardware, not applications — and certainly not operating systems. The magnitude of Microsoft's marketing and advertising campaign for Windows 95, however, should alleviate at least some of this upgrade hesitancy.

Nonetheless, with 15.7 million new Windows 95 PCs shipping worldwide in 1995, the new OS will earn an impressive 27.4% of the total new PC market. The reality that Q4 alone will account for a significant portion of the total units shipping this year partially explains Windows 95's significant share, but it is admirable nonetheless. Looking toward the end of the century, we can see that Windows 95's share of worldwide PC shipments will grow steadily, from 62.7% in 1996 to 71.7% in 1999.

## PC OS Trends

The role of the desktop operating system is being redefined by three related concepts: application platforms, user interfaces, and component software. Contrary to what the popular press claims, operating systems now do far more than "control the basic functions" of a computer. Today's typical "desktop" OS includes not only miniature applications, but, increasingly, middleware and networking, distributed computing and directory services, and mail services. The evolution of the OS, however, is being driven by the rise of applications as "platforms,"

the "brand equity" of user interfaces, and the migration toward component-based software.

### Application "Platforms"

Suppliers of system-level software, perhaps most notably Microsoft, have realized that a highly profitable "architectural franchise" can be built on top of application programming interfaces. That is, the supplier of the APIs to which the software is written is the controller of the standard and, to a degree, the software developer. Many have accused Microsoft of unfairly using its control of the Windows API to the benefit of its application division. Whether or not this assertion is true, it highlights the widely understood importance of APIs: they can be a potent competitive weapon in the modern world of open systems.

API control of this nature is pretty well understood and largely defines the "Win" part of the much-discussed "Win-tel" joint-monopoly theory (under which Microsoft, through its Windows franchise, and Intel, through its processor dominance, supposedly rule the modern computing era). API power is not limited to the OS, however. As was the case when DOS applications were users' operating environments (and savvy developers sold add-on products for those applications), today's Windows applications are emerging as increasingly viable software-development "platforms." Microsoft understands this concept well, as evidenced by its efforts to push its Office suite of applications as a "platform," as well as its efforts to make Office more platformlike by streamlining the interface and sharing components such as spell checkers.

Another notable example of an API becoming a platform is Netscape Communications' Navigator Web browser. By achieving dominance in the browser market (through giving away a superior product), Netscape now defines the browser standard. When developers are looking to create software that works with browsers for the World Wide Web, Netscape's is the first (if not the only) one they target. "Helper" applications (which do things like play sound and/or video and view graphics) are already available from third-party developers. These applications have been expressly designed to work with Netscape's Navigator. In this sense, Navigator has become the development platform for Internet applications.

Thus, in the same way that Microsoft has achieved dominance in the desktop-application market through controlling the Windows API, Netscape may achieve dominance in the Internet-application market through controlling the Navigator API. Even now, Netscape is leveraging the Navigator API to sell Web server software. As new capabilities are added to the Navigator browser — for example, the ability to display tables — Netscape's server software is the first to support them.

Emerging hardware platforms also represent opportunities for software firms to establish API power. Handheld computers, set-top boxes, and Internet "terminals" all represent potentially high-growth markets in which a dominant OS has yet to be established. Furthermore, given the varied and specific requirements for each environment, to the extent that there is existing competition, the playing field is relatively flat.

### User Interfaces

As control of the software developer can be gained through the API, control of the user is gained through the user interface. In the old DOS days, the operating system was in a sense invisible to the end user; it was the application (like Lotus' 1-2-3 spreadsheet or WordPerfect's namesake word processor) that defined the user interface. But with the advent of the Macintosh, and then Windows, the developer of the OS gained more control of the "user experience."

Windows 95 hype to the contrary, it is not clear which direction user-interface

leadership will go. Typical business PC users, for example, spend more time in applications — especially in integrated suites — than in the OS shell. Future competition in the user-interface area will emerge over which tools users employ to navigate the following and other "landscapes":

- Suites of applications and, later, components
- LAN resources
- WAN and corporate resources
- Home and consumer services
- Mobile systems interacting with all of the above

### *Component Software*

Application suites (like Microsoft Office) are an early step toward what is being called component software. Driving the need for component software are monolithic, multifunction applications that are unwieldy to build, maintain, and sometimes even use. By separating functions into components and defining rules for their interaction, applications can be better tuned to specific users and tasks, and new technologies can be added more easily. A simple example of component software design is using a single spelling checker for an entire applications suite (word processor, spreadsheet, etc.).

What level of functionality is required in the OS to enable component software is debatable. For example, the interface for navigating among components, and tools that allow power users to glue components together to customize application functionality (scripting languages, visual interfaces) might reside in what we think of today as an OS. Or, component tools could sit atop some sort of component framework. At the very least, some level of basic infrastructure within the desktop operating system is required. The nature of this foundation and the component standard(s) it supports will be another point of leverage for software firms, much like that of more standard APIs.

## Client/Server

For the past few years, client/server has been one of the IT industries hottest buzzwords. In a sense, client/server represents the joining of the mainframe-centric era and PC-focused epoch. Client/server deserves buzzword status as the implications of harnessing the flexibility and ease-of-use of relatively low-cost desktop computers in conjunction with the reliability and scalability of large-scale systems become incredibly significant. In fact, the promise of the client/server architecture has proven so intoxicating that both vendors and customers have forgotten lessons learned from years of experience. Perhaps most important, they've underestimated the complexity of developing large-scale mission-critical applications. No silver bullets exist for application development of this nature despite the sex appeal of today's slick client/server software and the associated marketing hype.

This is not to say that existing client/server software — for example, Powersoft's PowerBuilder — is a feeble tool. Today's client/server tools are not only incredibly useful and powerful, but they offer previously unheard-of functionality. Problems occur, however, when vendors inevitably oversell their product's capabilities and customers, sadly, believe them.

## The Little Client/Server Footprint — Exploiting the Desktop

The broader client/server architecture can be thought to consist of little client/server and big client/server segments. Little client/server tools are focused on the client side of the application, and because they are, the client typically contains not only the presentation and data-access capabilities, but also the business logic that structures the application. This client focus also allows for rapid change and quick development as a result of the following client-side features:

- **GUIs**, which are quickly painted through point-and-click visual tools
- **Data-access routines**, which are designed graphically, allowing the rapid building of applications that access data from several sources
- **Data integration**, which delivers interoperability with personal productivity tools such as spreadsheets
- **Database independence**, which allows applications to be easily ported across a variety of database servers

Examples include PowerBuilder from Powersoft and Microsoft's Visual Basic and Access.

The requirements for little client/server development, which is typically for workgroup or departmental applications, tend to be of a smaller scale than traditional centralized applications. Little client/server applications are frequently developed under the following circumstances:

- **Pilot project**. Projects are typically pilots designed to test the feasibility of client/server for the task at hand. Companies usually buy limited copies of the tools they use, but to which they have not yet developed long-term loyalty.
- **Just-do-it-now mindset**. An iterative prototyping approach is used; up-front business analysis and modeling are rarely conducted.
- **Decision support or noncritical applications**. The most common application type is decision support. Where applications are updated, they generally are noncritical.
- **Single business function.** Applications generally automate the needs of a single business functional area. Applications are not built to serve the needs across business functional areas.
- **Small number of concurrent users**. Concurrent business users generally range from just a few up to the higher limits of 10–20.
- **Simple business rules**. Functions supported are simple and straightforward. Highly complex business logic (which codifies detailed business procedures) is far less common.
- **Relational data access**. Most often, applications are designed to access relational data on a server. Access to mainframe data may be supported. However, little capability is provided to build applications that are truly integrated with mainframe data.
- **Limited file sizes**. The relational files accessed are small to medium in size.
- **Small development teams**. By traditional terms, development teams are commonly small, with one or two developers each. Upper limits range from three to six developers.
- **Short application life**. Emphasis is on quickly building applications that in turn can be quickly changed. Taking the time to design applications for long life is not a priority.

## The Big Client/Server Footprint — Putting the "Server" into Client/Server

Big client/server tools exploit both the client and the server sides of the wire. These tools also have more demanding requirements relative to little client/server tools. They need to be mission-critical capable and support hundreds of concurrent users, for example. Accordingly, development of these tools is particularly difficult. Not only must they be able to scale up to handle large numbers of simultaneous users running mission-critical applications, but they must also scale down to allow the rapid development of simple applications or the start of a complex application. The solution currently

receiving the most public attention is application partitioning, which is a fundamental element of deployment scalability. Application partitioning solutions include the following:

- Teleprocessing monitors such as Encina and Top End
- Middleware like OEC's Entera
- Tools such as those from Seer, Intersolv, Texas Instruments, and Andersen Consulting

Most discussion of application partitioning focuses on a three-tiered approach to application distribution in which the data, business logic, and presentation/input/validation are independent from one another.

## Scalability Rules

As long as little client/server tools are used to build applications with little client/server requirements, the tools work well. Trouble occurs, however, when customers try to scale up their little client/server applications or use their little client/server tools to develop big client/server applications. The fundamental limitation of little client/server applications and tools is the inability of their two-tiered, client-centric application model to scale up. As most customer client/server activity has been in the little client/server realm, this is a dilemma that users and vendors have been grappling with for several years.

Vendors, on the one hand, usually promise more than their products can realistically deliver. Users, on the other hand, believe the vendors, fall in love with the solution, and forget that there is no silver bullet for large-scale, mission-critical application development. The situation is further aggravated by the fact that the whole little client/server mindset is to "do it now" as a "pilot program" to test client/server, and no business analysis or modeling takes place. As a result, it is all the more surprising and disappointing when the resulting application can't scale up for production use or fails to work as intended.

## Implications for Vendors

What are vendors in the client/server market to do? Be careful! The repercussions of little client/server's inability to scale are enormous. IDC knows of a few situations (and there must be more) in which strategic little client/server deployments went millions of dollars over budget and still failed to deliver even a fraction of what was intended. Given these high stakes, it pays to be earnest about one's product's capabilities and to work closely with customers. Once burned, customers will be loath to come back for more.

Ultimately, the race will go to vendors who embrace the limitations of little client/server and create a continuum of products that provide customers the scale they need. Little and big client/server are really just steps along the path to distributed computing. Thus, vendors need to have a set of complementary tools that make up a broader solution that spans little and big client/server.

# Product Page

## Gateway 2000 — P5-133 Tower PC

"It's obscene!" This is how my wife (Ellen Julian of IDC's Training and Education research service) describes the P5-133 tower PC that Gateway 2000 recently sent. Given its top-of-the-line Pentium/133 processor, 32MB of RAM, 4x CD-ROM drive with three-CD changer, wavetable sound card, and 28.8Kbps fax/modem — to name a few features — the Gateway "tower of power" is pretty "obscene," but is surprisingly standard for Gateway. The vendor has always tended to ship relatively high-end configurations; in 1994, Gateway's Pentium-based desktop shipments in the United States were roughly twice the industry average.

The system Gateway sent, however, and my experience with it, highlight some of the challenges the company will face as it endeavors to expand its presence in the PC market. More specifically, the vendor may need to more carefully balance its desire to use the latest cutting-edge components with supportability and usability. This is particularly true if Gateway hopes to achieve growth by moving beyond its PC-savvy customer/prospect base.

### *"You've Got a Friend in the Business"*

Over the years, Gateway has consistently differentiated itself by building its PCs from the latest high-performance components, configuring them generously and offering them at very competitive prices. This strategy has served this vendor well, enabling Gateway to steal the No. 5 position (in U.S. unit shipments) from Dell in 1993, a position the company still holds as of 3Q95, according to preliminary data.

Furthermore, this strategy has helped Gateway achieve admirable customer loyalty and even advocacy. According to a survey conducted as part of IDG's "Buying IT in the '90s" series, 69% of PC buyers surveyed rated themselves as very likely to repurchase a Gateway PC (just behind HP and Apple with 70%, and ahead of Compaq, IBM, and Packard Bell), and 24% considered themselves Gateway missionaries (behind Apple and HP with 39% and 25%, respectively, but ahead of Compaq, IBM, and Packard Bell). Gateway's down-home and folksy, "You've got a friend in the business," marketing campaign also fuels its positive customer ratings. Users feel good about recommending an approachable underdog that provides excellent value.

The downside of Gateway's cutting-edge components approach is supportability. Technical support issues are inevitable when system components change on an ongoing basis, especially when those components are brand new and employ the latest technologies. For example, the system I tested included Matrox's impressive new Millenia video card. Not only were updated drivers already available by the time I received the system (drivers that for the first time unlocked the true potential of the board, the drivers that were shipped were minimal), but so was an updated BIOS. To Gateway's credit, it does a better job than most vendors of making such things readily available via its Bulletin Board System, and now its Web site. (In fact, the competition could learn from Gateway's example.)

Such glitches, however, result in suboptimum performance at best and dead systems at worst, neither of which is acceptable to customers. In fact, according to the "Buying IT in the '90s" survey, reliability was rated as the most important PC trait for both work and home use — above traits like effective customer service/support and price. To date, Gateway has been somewhat buffered by its technically savvy customer base, which isn't coy about opening PCs, downloading drivers, or configuring jumpers.

However, for Gateway to move beyond the do-it-yourself portion of the PC market and attract less sophisticated customers, it needs to strike a better balance between features/performance and supportability. Not everyone feels comfortable going online, downloading, and installing new drivers to get the maximum benefit from a PC (let alone opening the system and configuring DIP switches as I did to update the video board's BIOS).

THE GRAY SHEET
# Computer Industry REPORT

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# Multiuser Systems — Wintel Is Coming!

More than ever before, the multiuser-system market is under assault from both Intel and Microsoft. Intel's influence is derived from its processor fabrication assets and prowess. Only a handful of vendors have fabrication capabilities comparable to Intel's, and even fewer that can use such resources as cost effectively. As a result, small and medium-scale system vendors — who by and large don't use Intel processors — are increasingly finding themselves in competition with less expensive Intel-based alternatives.

Microsoft's power, meanwhile, is based on its control of the PC operating system (Windows) and applications (the Office suite). In controlling these APIs, Microsoft in effect holds the keys to the desktop. With its more industrial-strength Windows NT operating system and the associated BackOffice applications, Microsoft is seeking to expand its influence beyond the desktop thoroughly into the enterprise. Although the vendor has tried to do so before (with LAN Manager), this time it has a superior and more complete product line, and users are taking Microsoft seriously.

A great deal of multiuser-system vendor activity is centered on the processor dilemma and the cost issues it raises. IBM is moving many of its multiuser systems to the PowerPC. Digital is migrating its lines to the Alpha chip. Other mainframe vendors are also transitioning to CMOS-based systems. All of these efforts are geared toward improving performance, but they also have an eye to cost: multiuser vendors not directly facing Intel today are probably competing with someone who is.

As important as such hardware-centric cost and performance issues are, software will likely prove to be the Achilles heel for many multiuser efforts. In the case of large-scale systems, new CMOS-based hardware will help reduce overall system costs — and put them on the same price/performance curve as PCs — but software pricing will also need to be brought in line. On the small-scale systems front, vendors need system software support if their multiprocessor efforts are to be realized.

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Not coincidentally, these weaknesses (especially pricing) are where Microsoft is strong. Combine these factors with the fact that across the entire multiuser-systems market customers are demanding better systems and network management tools from everyone with whom they do business — and much of this is driven off the desktop that Microsoft owns — and Microsoft's enterprise efforts become even more threatening.

In the end, multiuser-system vendors must strike the right balance between hardware and software. At the end of the day, what determines the appropriate mix is the utility it provides to specific types of computing tasks. Thus, Intel-based systems will not replace large-scale mainframes anytime soon because the software support isn't appropriate for many of today's mainframe environments and customers, even from Microsoft. Nonetheless, even large-scale vendors must consider their architecture choices carefully. Although they may not be facing direct competition from Intel and Microsoft now, they are facing vendors who are facing it.

This issue of *The Gray Sheet* will investigate the worldwide multiuser-system market in more detail. More specifically, after presenting International Data Corporation's latest market data and general analysis on multiuser systems and traditional workstations, this issue will analyze Microsoft's enterprise strategy in greater detail. After all, obtaining multiuser-system-like performance with Intel-based chips is relatively straightforward. Only when appropriate software for an Intel-based platform is available will the Wintel (Windows/Intel) threat come into full bloom.

## Market Overview

In light of these issues, it is clear that many multiuser-system firms are facing several serious threats. The good news is that after a number of years of declining revenues, the multiuser-system market is starting to rebound. In 1994, worldwide multiuser-system revenue was nearly $65.0 billion, a 7.6% drop from 1993. Through the end of the decade, however, revenue should increase slightly, hitting $75.9 billion in 1999.

Make no mistake: compared to other IT market segments, multiuser systems are far from a high-growth market, brimming with untapped opportunity for everyone. However, if multiuser vendors can successfully lower costs to remain competitive while continuing to meet their existing customers' needs, significant profitability should be at hand.

### *Large-Scale Systems*

After several years of steady decline, revenues in the large-scale systems market stabilized in 1994. In the future large-scale unit shipments will increase from 22,470 worldwide in 1995 to peak at 22,569 in 1996. Afterwards units will decline, hitting 21,908 in 1999. The increase in shipments, however, will be more than offset by falling average system values, which will drop from $7.9 million in 1995 to just $5.9 million in 1999 as vendors move to lower-cost CMOS-based systems. As a result, worldwide large-scale revenue should continue to decline, from $22.5 billion in 1995 to $21.9 billion in 1999.

Worldwide Multiuser Systems Market

| | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 |
|---|---|---|---|---|---|---|---|
| **Large-scale** | | | | | | | |
| Units | 2,651 | 2,737 | 2,846 | 3,058 | 3,342 | 3,544 | 3,727 |
| Installed base | 26,322 | 27,179 | 27,984 | 28,818 | 29,637 | 30,367 | 31,213 |
| Revenue ($M) | 23,674 | 21,917 | 22,470 | 22,569 | 22,344 | 22,178 | 21,908 |
| **Medium-scale** | | | | | | | |
| Units | 37,627 | 38,996 | 42,976 | 47,063 | 51,388 | 55,530 | 60,210 |
| Installed base | 402,797 | 337,227 | 337,241 | 342,652 | 351,734 | 363,971 | 378,485 |
| Revenue ($M) | 24,132 | 20,799 | 21,130 | 22,090 | 23,252 | 24,445 | 25,737 |
| **Small-scale** | | | | | | | |
| Units | 456,500 | 505,427 | 557,347 | 611,365 | 688,114 | 773,479 | 873,449 |
| Installed base | 3,841,611 | 3,957,062 | 4,216,304 | 4,593,837 | 5,070,269 | 5,640,850 | 6,346,511 |
| Revenue ($M) | 22,481 | 22,209 | 23,310 | 24,359 | 25,606 | 26,856 | 28,254 |
| **Total multiuser** | | | | | | | |
| Units | 496,778 | 547,160 | 603,169 | 661,486 | 742,844 | 832,553 | 937,386 |
| Installed base | 4,270,730 | 4,321,468 | 4,581,529 | 4,965,307 | 5,451,640 | 6,035,188 | 6,756,209 |
| Revenue ($M) | 70,287 | 64,925 | 66,910 | 69,018 | 71,202 | 73,479 | 75,899 |

*Source: International Data Corporation, 1995*

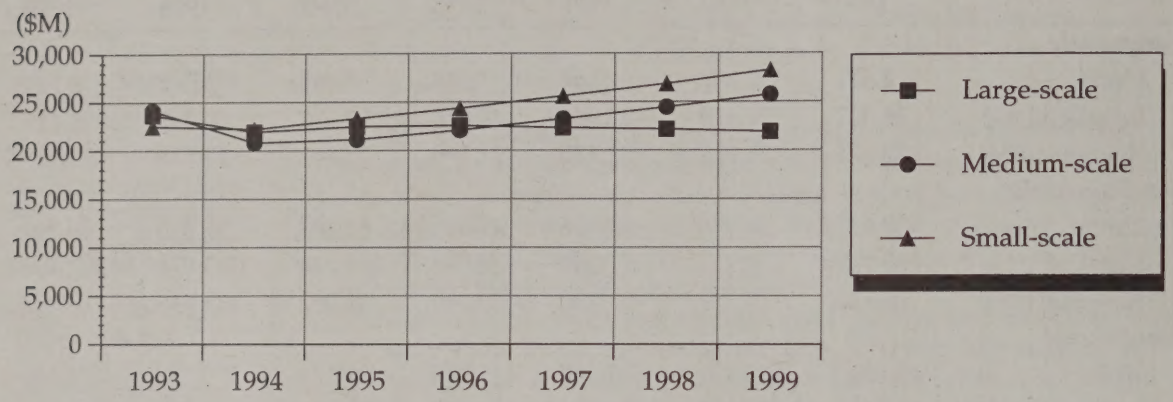
Although downsizing is still a factor in the large-scale systems market, most wholesale downsizing (in which an organization's mainframes are completely replaced with alternative platforms) has already taken place. In fact, some customers are recognizing the validity of certain mainframe applications. Online transaction processing (OLTP) and batch applications in particular continue to be maintained on mainframes because they are well suited to high-volume transaction environments. Given this capability, customers are hesitant to migrate since rewriting these applications would be prohibitively expensive. Thus, if large-scale system costs are simply brought in line, customers will be happy to continue using them.

As a result, migration to the CMOS architecture is one of the key challenges large-scale system vendors face because it is so closely tied to the expense of large-scale systems. Managing this major transition will be tricky, and vendors will have to determine pricing carefully (and control revenues and expenses to retain profitability under lower pricing schemes). However, CMOS systems should bring large-scale-system cost structures in line with midrange offerings by putting the processor on the same price/performance curve as PCs. Once costs are similar between large-scale and midrange solutions, customers will have little reason to migrate given the expense of doing so.

Large-scale system vendors will also be migrating to massively parallel processor (MPP) architectures over the next few years. This transition will prove critical, as MPP capabilities will help differentiate large-scale systems from increasingly powerful midrange alternatives.

Other issues that large-scale vendors will need to cope with include depressed storage revenues, ongoing third-party competition, and software costs that remain relatively prohibitive.

Worldwide Multiuser Systems Revenue: 1993–1999



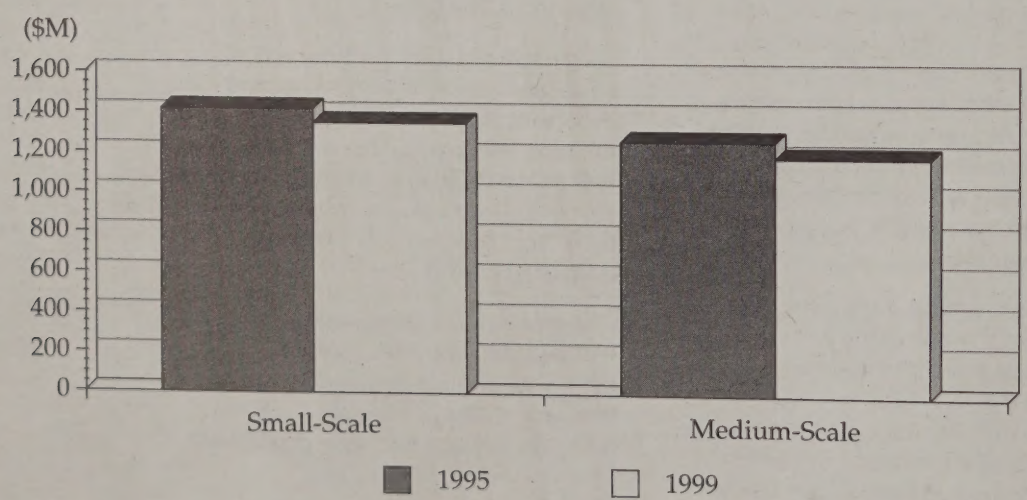

*Source: International Data Corporation, 1995*

### *Medium and Small-Scale Systems*

The medium- and small-scale-system markets, known collectively as the midrange, have been the first of the multiuser-system segments to face intense and direct competition from Intel-based offerings. As a result, vendors have been scrambling to reduce costs and lower pricing, particularly in the small-scale space where firms increasingly face traditional LAN-server players like Compaq. As with the rest of the multiuser market, software support will also play a critical role as vendors implement multiple-processor architectures to boost performance across the midrange.

The outlook for both the medium-scale and small-scale segments through 1999 is for moderate growth. Fueled by demand for larger Unix SMP (symmetric multiprocessing) systems, medium-scale worldwide revenue growth will

U.S. AS/400 System Revenues: 1995 and 1999




*Source: International Data Corporation, 1995*

## Definitions

- **Multiuser systems** comprise all large-, medium-, and small-scale systems, and all computer systems except personal computers and workstations.
- **Midrange systems** comprise all medium- and small-scale systems.
- **Large-scale systems** are either large general-purpose or high-speed scientific computers with average system values generally in excess of $1 million. Representative systems include IBM's 308X, 3090, and water-cooled 390 series and their competitors, as well as so-called supercomputers. Currently-shipping models in this category typically support 128 or more users in a commercial environment.
- **Medium-scale systems**, which include traditional supermini-class computers and some systems classified by their vendors as small mainframes, generally have average system prices (ASPs) ranging from $100,000 to $1 million. Currently shipping models in this category typically support 33 to 128 users in a commercial environment. Representative systems include IBM's 43XX, 9370, System/38, the larger AS/400, and the air-cooled 390; the upper ranges of Digital's VAX series (including all 8000s and 6000s); and their competitors. Medium-scale systems are typically packaged in large file-cabinet-sized or rack-mountable configurations.
- **Small-scale systems** typically range from $10,000 to $100,000. Currently shipping models usually support 2 to 32 users in a commercial environment. Small-scale systems are also commonly used in automation, control, and communication processing environments, and increasingly as network servers.

  Representative systems include lower-range VAX systems from Digital (including all nonworkstation MicroVAXs); the Series/1, System/36, smaller AS/400 models, and server/multiuser configurations of the RISC System/6000 from IBM; and low-end multiprocessing multiuser microprocessor-based systems from Altos, NCR, et al.

  High-end commodity-chip models with multiprocessing capabilities specifically designed to function as multiuser systems or servers are counted as small-scale systems, even if manufactured by vendors typically associated with the PC or workstation market (for example, the Compaq Systempro or Sun Sparcserver). Small-scale systems are typically packaged in desktop boxes or deskside towers.
- **Traditional workstations** are defined by processor, operating system, and typical price band. This segment of the market includes the typical workstation-class processors like Sparc, MIPS, PA-RISC, PowerPC, and Alpha. The operating system includes advanced environments, primarily Unix. A typical price for this type of system falls in the $12–15K range. The majority of these systems are sold into technical applications.

  *Note: The AS/400, Open VMS, Unix, and S/390 figures in this issue help quantify how the various multiuser hardware platforms map to IDC's small-, medium-, and large-scale categories.*

vacillate from a modest 1.6% growth in 1995 to a high of 5.3% in 1997, a rate it will reach again in 1999 after falling to 5.1% in 1998. As with the large-scale segment, revenue performance will be constrained, not so much by unit shipments (which will increase moderately) as by falling prices. The large-scale segment, however, will close out the century with roughly 6.0% year-over-year price erosion, and medium-scale systems will fall by only 3.0%.

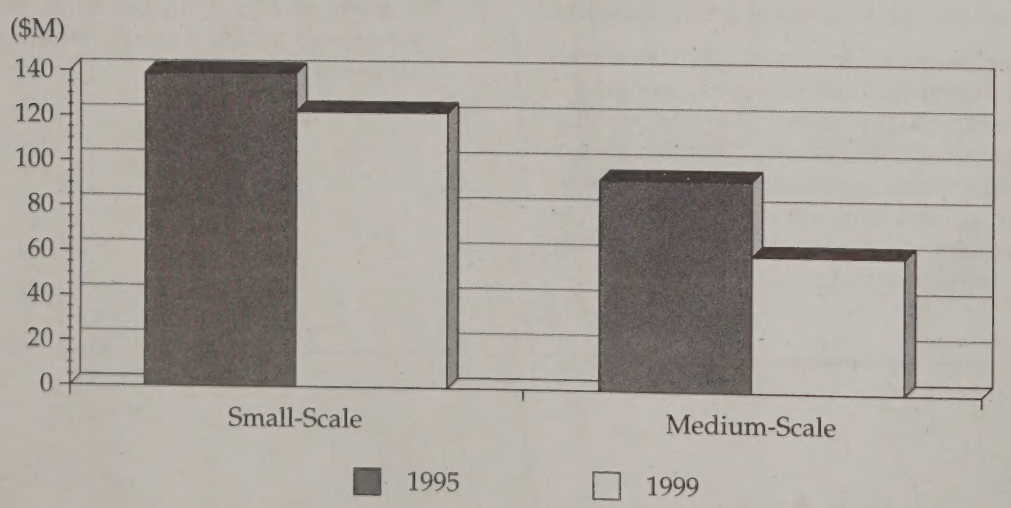
From a platform perspective, Unix systems represent the only segment (vs. AS/400, Open VMS, and S/390) with increasing revenues (in both small- and medium-scale installations) from 1995 to 1999. Despite the increased stature of Unix platforms in the medium-scale range, non-Unix product families offering specialized value and baseline Unix affinity, like Tandem's Guardian systems, will continue to thrive.

Small-scale-system worldwide revenue growth, driven by the development of application-server markets, will hover around 5% through 1999. Compared to the medium- and large-scale-system markets, the outlook for worldwide small-scale-system shipments is actually strong as this segment will steadily expand to nearly 13% year-over-year growth by 1999 (compared to 8% and 5% for medium- and large-scale, respectively). More so than the other segments, though, the small-scale market will face intense price pressure from Pentium Pro solutions running Windows NT.

Because small-scale systems typically have far less margin in them than medium- or large-scale installations, part of the solution is to avoid competition with Pentium Pro offerings by taking the high road and providing utility — likely software based, reliability related, and tied to very specific tasks — that Intel solutions can't match. In addition, small-scale vendors need to shift distribution channels to reach today's customers where they like to shop. Direct sales should just be one part of a broader distribution-channel strategy.

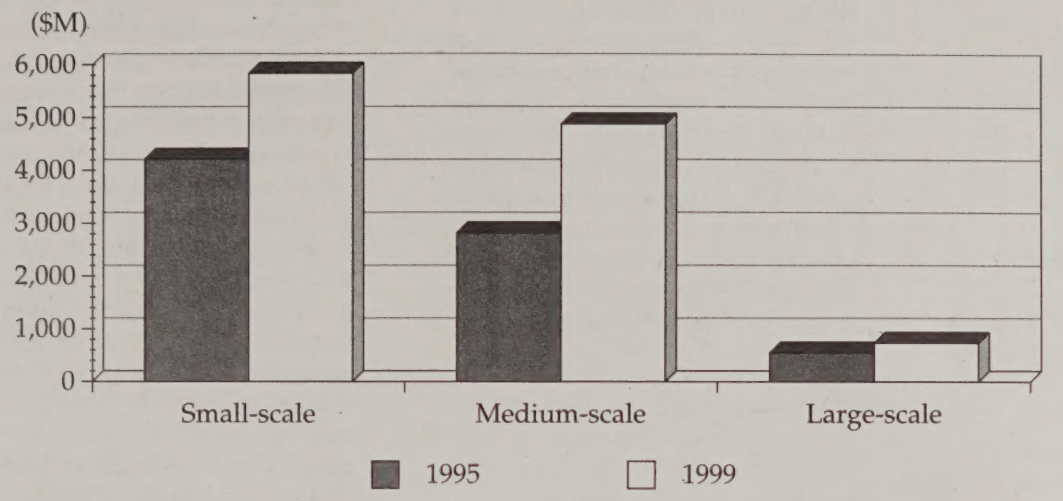
From an installed-base software perspective, Novell with its NetWare 4.x is the heir-apparent for alternative application servers. How well the vendor diffuses this technology will strongly influence the outlook for traditional midrange and Windows-NT-server offerings. Unfortunately, much of the current buzz is elsewhere (much of it with Windows NT), and the ball is now in Novell's court.

U.S. Open VMS System Revenues: 1995 and 1999



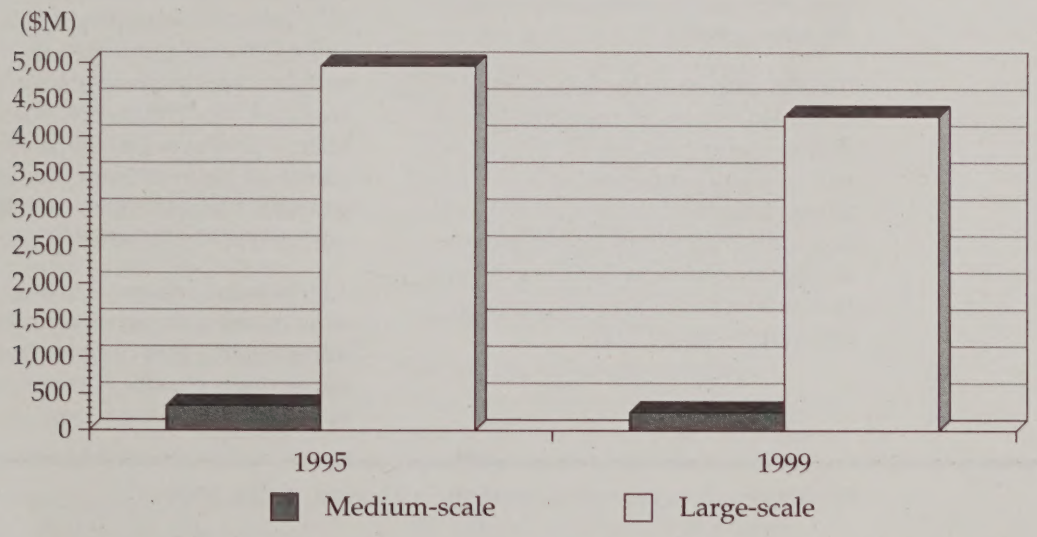

*Source: International Data Corporation, 1995*

U.S. Unix System Revenues: 1995 and 1999




*Source: International Data Corporation, 1995*

U.S. S/390 System Revenues: 1995 and 1999




**S/390 medium-scale includes 370 medium-scale*
*Source: International Data Corporation, 1995*

### *Traditional Workstations*

The traditional workstation market is holding its own, despite aggressive competition from Intel-based offerings, primarily at the low end. In 1994, fueled by pent-up demand, worldwide traditional workstation unit shipments grew by 19% to 618,550, while revenue expanded 5% to nearly $10 billion. Thus, although the ASP fell by 12% to $15.8K, this decline was more than offset by increased volume.

Nevertheless, the popularity of Intel-based PCs running Windows NT will erode growth in the traditional workstation market. Although Windows NT-based systems are unlikely to steal much business in technical applications (where workstations currently dominate) by 1999, they will prevent workstations from expanding significantly into business applications. As a result, unit and revenue growth will slow for traditional workstations through 1999 when just over 1 million units will ship and revenue will hit $14.5 billion.

High-performance graphics and throughput will continue to be key differentiators in the traditional workstation segment. In this regard, workstation vendors must keep their systems a step or two ahead of NT offerings in order to maintain premium pricing. Relations with software developers will continue to be very important. Vendors must ensure continued application support and see to it that their hardware's performance benefits are fully realized.

By 1999, Sun and Hewlett-Packard will be the leaders in the traditional workstation market, but the third position will be a hotly contested spot. Based on Silicon Graphics' current growth rate and increasing popularity in growth niches, the company has the potential to overtake both IBM and Digital in unit shipments by 1999.

## Microsoft's Assault

Not content with virtually owning the desktop, Microsoft has set its sites on the enterprise, including the domain of traditional multiuser systems. To address this market, Microsoft has assembled a collection of technologies (including Windows 95, Windows NT, and BackOffice) and a clear strategy for assuming a leading role in migrating complex enterprise applications into shrink-wrapped, client/server topologies. For good reason, the vendor is taking an incremental, rather than revolutionary, approach. This strategy primarily is due to what its own technology lacks: among other things, a proven capability to take over the kinds of mission-critical tasks that are the mainstay of today's multiuser systems. Nonetheless, Microsoft deserves credit for its remarkably broad, well-thought-out, and increasingly effectively communicated vision.

Part of Microsoft's enterprise strategy is to recreate some of the familiar business rules and market conditions of the PC industry in enterprise applications and middleware. If it can create such an environment, its prospects for success are improved. Ultimately, however, Microsoft aims to tie its home/consumer efforts to its enterprise efforts to establish business transaction links it can control and by which it can profit.

At this point, Microsoft is not interested in creating the services and support infrastructure that complex business applications require; it is leaving this opportunity for its partners.

Worldwide Traditional Workstation Market, 1994–1999

| | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 1994–1999 CAGR (%) |
|---|---|---|---|---|---|---|---|
| Units | 618,550 | 704,605 | 783,200 | 860,100 | 944,500 | 1,036,000 | 10.9 |
| % growth | 19.0 | 13.9 | 11.2 | 9.8 | 9.8 | 9.7 | |
| Revenue ($M) | 9,793 | 11,433 | 12,116 | 12,872 | 13,620 | 14,537 | 8.2 |
| % growth | 5.0 | 16.8 | 6.0 | 6.2 | 5.8 | 6.7 | |
| ASP ($000) | 15.8 | 16.2 | 15.5 | 15.0 | 14.4 | 14.0 | -2.4 |
| % growth | -11.7 | 2.5 | -4.3 | -3.2 | -4.0 | -2.8 | |

*Source: International Data Corporation, 1995*

Volume 30, Number 21–22

### Windows NT

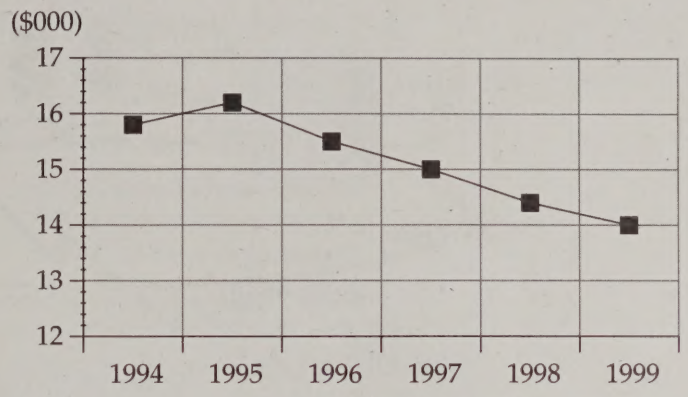
Windows NT is Microsoft's attempt to reach beyond the desktop into corporate business applications. Though it comes in both workstation (heads-down, customized, critical applications — not the early successor to Windows as a mainstream desktop) and server versions, it is more importantly targeted as a server OS, typically as an application server.

Windows NT includes the following functionality in the operating system itself: multitasking, SMP (symmetric multiprocessing), and multithreading (with OS scheduling at the thread level). Windows NT supports shared libraries and loadable device drivers. It is built with C2 security functionality and supports several disk structures, including a new NT file system. NTFS is a log-based file system allowing double-commit transactions and Unicode-based long file names.

With Windows NT, Microsoft is trying to take market share from Novell and from Unix. It aims to squeeze Novell with a pincer attack. By bundling file and peer network services with the desktop OS (Windows 95), and shooting "above" NetWare with its application server (Windows NT), it hopes to weaken Novell's position as the operating system that connects PCs to application servers. Microsoft's primary message against Unix is "a better Unix than Unix" — similar features, but with the shrink-wrapped compatibility (at least on Intel) that Unix has never provided.

Microsoft has also become much more pragmatic when it comes to network protocols. Rather than continue to bet on LAN Manager exclusively, the company has embraced IPX, TCP/IP and the Internet. This is an interesting development and shows that Microsoft is learning how to play in the so-called open-system world. Microsoft is trying to focus on large enterprise networks, but the products still lack many key networking capabilities, including full DNS (Domain Name Service), full TELNET, and complete NetWare support. Microsoft will be attempting to fix this over time.

Worldwide Traditional Workstation Average System Price, 1994–1999




*Source: International Data Corporation, 1995*

### BackOffice

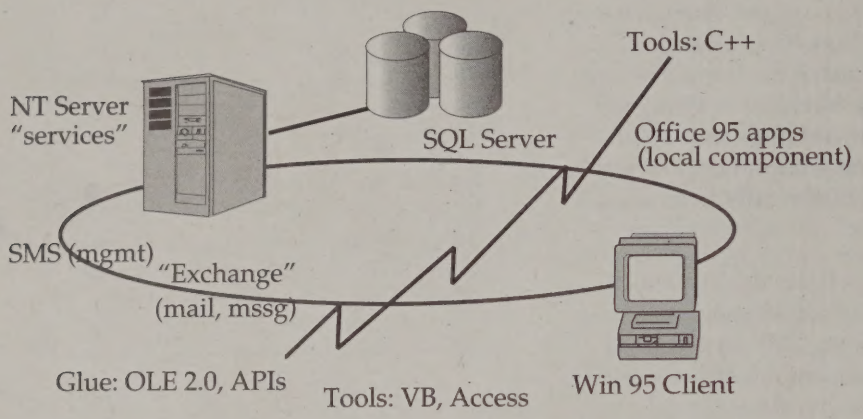
With BackOffice, Microsoft has sketched out a superb strategy — if not a delivery schedule — for integrating the core components of workgroup systems. Using BackOffice, IS departments, VARs, and integrators will be able to construct small- to medium-sized servers in an extremely broad variety of functional roles, site sizes, and channel-delivery mechanisms, all running on commoditized, primarily Intel-based, hardware.

The promised payoff is shrink-wrapped, network-ready applications with a coherent pricing strategy, the logical follow-on to desktop suites. As this approach plays to weaknesses of virtually all suppliers of advanced operating environments (AOEs), server systems, middleware, and multiuser applications, they must respond. Companies most vulnerable to Microsoft's marketing are IBM, SunSoft, Novell, and SCO.

### Other Initiatives

In May, Microsoft held its "Enterprise Development Strategy Days" session in Redmond, Washington. There it

Microsoft's Enterprise Assault Team




*Source: International Data Corporation, 1995*

sketched out a long-term strategy for delivering distributed computing, object technology, and transaction, query, and directory services. Microsoft's strategy as laid out is impressive in its scope, but lacking in key products and with only very vague delivery schedules.

In June, Microsoft announced it had acquired the intellectual assets of a U.K.-based management software company, Network Managers Ltd. This technology will ultimately be used to manage network devices such as routers and hubs (Microsoft is not OEM-ing the current line), positioned "above" SMS, but below network and system management tools from companies like Computer Associates and Hewlett-Packard. This is likely the correct positioning for these products and avoids confusion with OpenView and CA-Unicenter.

Later that month, Microsoft announced the Open Directory Services Interface, a set of WOSA application programming interfaces aimed at easing the integration between global directories such as Novell NDS and Banyan StreetTalk, X.500, and the future Microsoft Cairo-based product. Banyan and Novell offered moderate support. Banyan will support ODSI aggressively, hoping that Microsoft will fail to deliver on Cairo in a timely manner; Novell's support is far less serious.

Microsoft at the same time reiterated its directory strategy, calling Exchange the third step of a four-step process ending in Cairo. ODSI is a collection of APIs, some already available (WinSock RnR), some still in development (OLE DB and DS). It is a preemptive attempt by Microsoft to make it appear it is a global directory player when, in fact, it is not. The strategy is a good one and carries with it the only slightly tainted "open" label. Microsoft, does, however, continue to lack a true global directory, and this is a serious weakness in the client/server "platform" technology competition. Cairo probably will not offer viable directory services (let alone "universal query" and distributed object management) before 1997.

In September, Microsoft announced the 1.5 release of BackOffice, a minor upgrade. BackOffice is a brilliant packaging and pricing concept; however, sales of server "suites" are still minuscule. Other vendors (notably Oracle) are jumping on the bandwagon, but server foundations still appear to be chosen on a best-of-breed basis. Furthermore, Microsoft has yet to deliver or prove the benefits of component integration. Compaq did announce, though, that BackOffice would be included in its SmartStart server preloading scheme.

Finally, in December, Microsoft articulated an aggressive Internet strategy.

Although the announcement spanned consumers and business users, in the systems space Microsoft unveiled a pact with Computer Associates to Internet-enable a cobranded product (a combination of CA's CA-Unicenter/ICE with Microsoft's Windows NT and Internet Information Server) and announced a cross-licensing agreement with Oracle for Web scripting and programming software.

### *Microsoft's Media Machine*

Microsoft does a superb job of educating the masses — including the trade press and analyst community — on new technologies and markets. In so doing, it maximizes the benefit of both its real products and its technology plans. If Microsoft can continue to "brainwash" these influencers — making sure they get their understanding of new areas from Microsoft first — it can hold off competitors who are further along on their product cycles, a strategy Microsoft has used with great success on many occasions.

After all, Microsoft's theoretical mixing of transaction processing and object management is fresh and potentially viable, and its promise of integration and simplicity is seductive. Competitors should be frightened to consider that much of the influential press and analyst community — not to mention desktop ISVs — will get their first real exposure to these issues from the powerful Microsoft marketing engine.

Key areas where Microsoft is employing this strategy include the following:

- Distributed computing (middleware, etc.)
- Server suites
- Directory services
- Internet servers

Critical server-foundation areas in which Microsoft is not leading the education process include database, development tools, unstructured data management (groupware), and — outside the main technology foundation areas — transaction processing (though it has made inroads with the PC community) and data warehousing.

### *Cairo*

Microsoft's follow-up to Windows NT, code-named Cairo, is supposed to be:

- An object-oriented file system for use across a network
- A navigator or browser for that file system to locate objects and resources

In addition it is supposed to solve Microsoft's lack of an X.500-style global directory.

It can't possibly do all that and be delivered, as scheduled, in 1996 — even in beta form. In fact, in Microsoft's latest discussion of OLE, it introduced the concepts of OLE DB (previously code-named Nile), a component coordinator, and a universal query engine capable of searching unstructured data stored in spreadsheets and e-mail, as well as in databases. Although Microsoft's vision of combining object technology with transaction processing is intriguing, it also sounds like an excuse to slip the object features out of Cairo for a later product. We expect Cairo to have only rudimentary object features at launch; however, it should have a more scalable directory.

## Market Outlook

Windows NT application-server shipments will increase dramatically, to the point that NT challenges Unix for the lead in absolute volumes. Although NT will primarily be a local workgroup phenomenon, it will represent the larger volumes of shipments. Microsoft's early lead in packaging suites of server services, its tremendous marketing prowess, and its desktop momentum will drive these sales. Of the competitors, Microsoft will come the closest to "commoditizing the midrange" — transferring PC business practices (pricing, channels, shrink-wrapped software) onto more complex server applications.

Microsoft's own server applications or services (notably SQL Server, Exchange, and SMS) are currently not considered best-of-breed products in terms of functionality or scalability, but they are competitive and aggressively priced. Microsoft's ability to court ISVs and VARs for applications is unmatched, and even competitive ISVs (Oracle, Sybase) will probably be forced to support NT, joining less-competitive and thus more enthusiastic server application companies (Computer Associates, PeopleSoft, SAP).

### Winning Strategies: Little Guys

- **Target less than $50 million niches**
- **Vertical solutions based on Microsoft's Office or BackOffice**
- **Target "professionals"**
- **Build small-business "brand"**

The biggest holes in Microsoft's approach are the lack of a clearly defined development-tool strategy and very weak server management features in Systems Management Server. It also has a long way to go to prove to IS managers that its database and networking products should be considered when mission-critical systems are deployed. In its management offerings, Microsoft has so far concentrated almost exclusively on client application-software distribution, neglecting remote-server management, system administration, and management of heterogeneous nodes, applications, and services.

### Winning Strategies: Big Guys

- **Be Bill's Big Brother: gateway to the enterprise**
- **Take on role of infrastructure integrator**
- **Wall off Microsoft on the desktop and use Lotus, Novell, or other non-Microsoft "back-office" products**
- **Directory, management services, real databases**
- **Broker components**

## *What to Do?*

How should vendors position themselves against Microsoft? One is tempted to say, "If you can't beat 'em, join 'em." In fact, there are two categories of winning strategies: one for large vendors and one for small vendors.

Larger systems and/or software companies can recognize opportunities by exploiting Microsoft's potential enterprise success. This could be viewed as a "join 'em" approach — a vendor would offer products and services that are complementary to Microsoft's. Digital has used this approach superbly. Not only has Digital regained credibility in several markets through its support of Windows NT and its associated relationships with Microsoft, but these efforts synchronize well with other Digital initiatives. The Alpha chip, for example, desperately needed a relatively broad-based OS, a need that Microsoft has filled by supporting Alpha in Windows NT.

Big vendors could also take on the role of infrastructure integrators. Here again, Digital has cozied up to Microsoft, providing critical support and networking expertise. Conversely, large vendors could oppose Microsoft's enterprise efforts. In this sense, one could limit Microsoft to the desktop, using a Lotus, Novell, or otherwise non-Microsoft back-office product.

Smaller companies should target opportunities too small or specialized to be attractive to Microsoft, which must always build volume products. Thus, in general, less than $50 million niches are good candidates. Or, much larger but vertical markets could be targeted, like health care and insurance. In either case, a specialized solution based on Office or BackOffice could be offered, thus enabling indirect — if not direct — support from Microsoft.

Keep in mind that hybrid business models that include both services and software have been tried before, but are difficult to maintain. Such an approach usually requires rich services and a consulting infrastructure that is the stuff of larger players.

THE GRAY SHEET
# Computer Industry REPORT

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*Global market intelligence on the information technology industry since 1964.*

# The Era of the Wired Consumer: Detailing a New Vision for the IT Industry

The IT industry is in the early years of a wave of fundamental change and growth. IDC calls this new wave the "Era of the Wired Consumer" because the connection of consumers into an online marketplace will be the primary catalyst for the next wave of IT growth. This IT industry shift is at the heart of *The Gray Sheet's* 17 predictions for 1996 and beyond. The predictions follow the discussion of the views and assumptions underlying IDC's Wired Consumer vision.

The focus on consumers has not happened overnight, but the concept of the Wired Consumer is a recent phenomenon. In the first half of the 1990s, the industry "discovered" consumers: since 1991, consumer PC purchases have been the biggest factor accelerating industry growth. This is, in fact, the clearest evidence that the Wired Consumer era is well on its way. Yet, the industry has not actually reoriented its products, pricing, cost structure, packaging, and marketing to tap into the largest segments of the consumer market.

The industry has essentially been cream skimming the consumer market, tapping into the work-at-home and higher-income households, which are able to accommodate business market PC pricing and packaging. The below-expectations consumer sales in the fourth quarter of 1995 indicate that the cream is running out; to continue benefiting from a robust growth in consumer PC sales essential for robust growth in the PC and related businesses, overall suppliers must answer the question: "How must we change our company to tap into the broad middle-class segment of the consumer market?"

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## The Three IT Waves

Three distinct IT eras can be carved out of the last half century — the Back-Office Eras, the Front Office Eras, and the Wired Consumer Era. Each of the three major eras of IT industry growth is defined by massive change in the scope of IT users and applications that drive a new wave of growth. The three eras are defined by the dominant class of users and applications.

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**Back-Office Era** — In the early years of commercial computing, focused on the mainframe computer, the reach of corporate information systems was primarily to back-office staff and business functions (e.g., accounting). The "users" constituted a relatively small group of specialists, including a large population of data entry staff. Somewhat modest (albeit fast-growing) IT industry revenues reflected the narrow scope of users and business applications.

**Front-Office Era** — In the second wave of technology growth, beginning with terminal host systems, but dramatically accelerated by the PC and local area network, organizations were able to extend the reach of computing to front-office and field employees and business functions (e.g., customer service, tellers, cashiers, salespeople). With technology reaching this much broader segment, the number of users increased by one to two orders of magnitude. This dramatic increase in user and application scope fueled an order-of-magnitude increase in industry revenues in spite of the industry's remarkably steep price/performance curve.

**Wired Consumer Era** — In the third wave, in its early stages with the emergence of the consumer PC business and the explosion of the Internet, the business mission driving IT growth will be connecting information systems in many industries directly to consumers. (Business-to-business customer connections are obviously well under way and in many respects resemble a special case of the internal business automation of the second wave.) With consumers coming online, it is easy to imagine an increase in the number of users of one-half to one order of magnitude in the next 10 years.

Of course, cracking the consumer market requires much lower price points than today's business-dominated IT market; so we expect an increase in revenue of one-half order of magnitude in the next 10+ years. Even with that relatively "modest" jump in industry revenue, our projections assume that IT industry revenues will jump from today's less than 2% of global production to 3% to 3.5%. The next 10 to 15 years will be, as in the PC era of the past 15 years, a time when new fortunes are made in the IT industry.

## Era Transitions

Four important points can be established that distinguish these eras and the periods of transition between them:

- **New era = new scope of IT use**. Each era is characterized by emergence of technologies that dramatically increase the scope/number of users and applications of information systems. As discussed above, "dramatically" increase means by an order of magnitude.
- **Elements of the previous eras do not disappear**. Emergence of the new era does not mean that the applications and technologies in the preceding era are no longer important to the business community or to IT suppliers. However, the technologies and applications of the new era become the primary focus of new IT investment and growth.

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## Eras in the IT Industry

| | Back-Office 1950s–1970s | Front-Office 1970s–1990s | Wired Consumer 1996–2010 |
|---|---|---|---|
| Enabling IT infrastructure, architecture | Mainframe/terminal host computing | PC/LAN, client/server | Public networks, adaptive computing |
| Scope: class of IT users added in era | Back-office staff | Front-office staff | Consumers |
| Number of "wired" users | 100K–10M | 10M–100M | 100M–1B |
| IT industry revenues ($B) | 5–50 | 5–500 | 500–2,500+ |
| Key applications added | Accounting | Customer service, decision support, order processing | Self-service, entertainment, education, home productivity |

*Source: International Data Corporation, 1996*

For example, with the emergence of the PC and the front-office focus in the early 1980s, the mainframe applications that dominated continued to require significant investments for maintenance and enhancement. But the growth of this legacy business has seriously lagged that of the emerging PC and LAN-focused technologies and applications. And as the era of network and consumer focus emerges, PC and LAN-focused front-office and field automation efforts will not suddenly go away. But they will almost surely become subordinate to systems that interface directly with customers.

- **Legacy systems and users are transformed by new era**. The technologies, pricing, distribution channels, and business models of the new era have a strong impact on the products, vendors, applications, and user requirements in the predecessor eras' environments. For example, the PC clearly had enormous impact on the product design, pricing, and other aspects of the mainframe and minicomputer products.

As we enter the Wired Consumer era, it is clear that very different price points, cost structures, distribution strategies, and marketing approaches will be required to reach the consumer market, and those changes will profoundly alter the rules of success in the business computing market as well. For example, it is hard to imagine as consumers require PC suppliers to deliver high-function multimedia PCs at $1,000 or less that businesses will not be saying, "We want that too!"

Whether the consumer electronics giants of today prove savvy enough to lead the charge or a new generation of suppliers emerges, there is little doubt that the business computing market will converge with the new consumer electronics market. That is a truly frightening prospect for many suppliers who are struggling to maintain profitability in today's relatively comfortable business computing marketplace.

- **A new era opens the door for new leaders.** As a result of the accelerated growth brought by each new wave of technology and applications, new industry leaders emerge. For example, a look at the

## Key Metrics, Attributes of the Three Waves of IT

| | Back Office 1950s–1970s | Front Office 1970s–1990s | Wired Consumer 1996–2010 |
|---|---|---|---|
| **General** | | | |
| Enabling IT infrastructure, architecture | Mainframe/terminal, host computing | PC/LAN, client/server | Public networks, adaptive computing |
| Scope: class of IT users added in era | Back-office staff | Front-office staff | Consumers |
| Number of "wired" users | 100K–10M | 10M–100M | 100M–1B |
| IT industry revenues | $5–50B | $50–500B | $500–2,500+B |
| Key applications added | Accounting | Customer service<br>Decision support<br>Order processing | Self-service<br>Entertainment, Education<br>Home productivity |
| **Business Market** | | | |
| Steps between info. systems and customer | 2+ | 1+ | 0 |
| IT relationship to business process | Support | Support->embedded | Embedded |
| Corporate IT decision-maker/customer | CIO, CFO | CIO, CFO -> Business mgmt. | Business mgmt. |
| Business IT spending as % of revenues | <2 | 2.5+ | 5+ |
| **Consumer Market** | | | |
| Percent of PCs shipped to home, consumers | Negligible | 5–30 | 30–80 |
| Price of home PC | N/A | $2,000–4,000 | $500–1,000 |
| Percent of home network devices that are not PCs | N/A | 0–10 | 40–70 |
| **Technologies** | | | |
| Locus of IT innovation | Data center | Business desktop | Home/consumer |
| Computing model | Host-based | Client/server | Embedded/adaptive |
| Interface device | Terminal | PC->notebook | PC->intelligent everything |
| User interface look and feel | Character | 2D GUI | 3D/virtual reality |
| Interface/navigation metaphor | Paper | Desktop/folders | World (real, fantasy) |
| Interaction style, "feel" | Business | Business | Game |
| Application model | Static | Dynamic interface | Dynamic/simulation |
| Key technologies | Transistors core memory<br>Magnetic media<br>Cathode-ray tubes | Microprocessors<br>RAM<br>LAN<br>Winchester disks | WWW/Internet<br>Multimedia/VR<br>wireless<br>Objects/simulation<br>Parallel processing |
| **IT Business Model** | | | |
| Distribution channels | Direct | Direct->indirect | Indirect->direct |
| Software licensing | Big-ticket, rental | Small-ticket, purchase | Mix of purchase, nano-rental |

*Source: International Data Corporation, 1996*

top 20 North American IT suppliers in 1994 reveals that fully one-half are essentially creatures of the PC era of the past 15 years.

Indeed, of that group, only the seminal PC-era vendors Intel, Microsoft, and Apple even existed before 1978! These newcomers replaced 10 dominant suppliers of the prior era. As the Wired Consumer era rolls in this decade, which of today's leaders will drop off, and what suppliers will replace them? It is quite possible that one-half or more of the top 20 in 2005 to 2010 will be companies that are in their infancy today or don't yet exist.

## Impact of the Wired Consumer Era on Business Computing

Although the Wired Consumer era will be consumer focused, it will be largely business funded. The huge commercial opportunity a community of wired households presents to many industries in publishing, entertainment, financial services, retailing, food services, transportation, utilities, government, manufacturing, and yes, information technology and services will stimulate the investment that is necessary to accelerate the development of the vision into reality.

When financial services companies that have a direct sales force can cut their distribution costs by more than half, when publishers can cut costs for end-to-end delivery of their information by 80%, and when grocery chains can do your shopping for you and deliver to your home for less than what it costs to support today's self-service shopping model, there will be enormous incentive for these businesses to invest in the creation of a base of wired consumers. And the sooner the better.

**Steps Between IS and the Customer.** Business's overarching goal is to reduce the layers between the information system and the customer. The reason IT suppliers should care about the business goals of their corporate customers is that these goals will drive corporate IT investment.

Most corporate executives would tell you that today's systems are poor at quickly and faithfully relaying what customers and prospects are doing and thinking. This is in great part due to the layers that sit between the customer and the information systems management uses to make decisions; these layers include customer service reps, salespeople, and bank tellers, among others. Further, the layers that diminish market fidelity add tremendously to the costs of doing business. The business goal that will drive most new IT investment in the coming decade, therefore, is to "disintermediate" — get the intermediary out — between the customer and the corporation. The payback is in more accurate market reads, faster response, and lower costs.

### Transformation of the PC Market

| | Back Office | Front Office | Wired Consumer |
|---|---|---|---|
| Percent of PCs shipped to home, consumers | Negligible | 5–30 | 30–80 |
| Price of home PC ($) | NA | 2,000–4,000 | 500–1,000 |
| Percent of home network devices that are *not* PCs | NA | 0–10 | 40–70 |

*Source: International Data Corporation, 1996*

**IT Relationship to Business Process.** IT is increasingly an integral/embedded part of the product. In the Wired Consumer era, as corporations accelerate their leverage of IT to improve cycle times, enhance quality, and reduce costs, information systems are shifting from a role of supporting largely manual processes to becoming embedded components of highly automated processes. In an increasing number of industries, IT has become literally part of the product, as well as an embedded element of the product's development, manufacture, marketing, distribution, and support.

**Corporate IT Decision Maker/Customer.** IT decision making is continuing to shift to product or business-oriented decision makers. As IT has become more integral to the product in the Front-Office era, we have already seen an increasing shift of IT decision making to product-oriented management (vs. IS management). In the Wired Consumer era, the use of IT to tighten the connection to customers will accelerate this shift of IT decision making to business-oriented managers and away from technical management.

**Business IT Spending as a Percentage of Revenues.** As IT becomes more integral to the product in virtually all industries, we anticipate a higher percentage of revenues to be spent on IT. Today, across industries, an average of 2.0% to 2.2% of revenue is spent on IT. These numbers reflect a range of industry IT spending patterns including, on the low end, retail, which is highly labor intensive and spends about 1% or less on IT. On the high end is telecommunications, in which the product is highly dependent on information technology and in which one typically sees 5% to 7% of revenues spent on IT. During the next decade and a half, as IT becomes entwined in the product, more industries' IT spending patterns will start looking like those in today's telecommunications industry. The building of the electronic marketplace in the Wired Consumer era will be the focal point for this increased IT investment.

**The Wired Consumer Effect on the PC Business:** As noted earlier, the disappointing financial results of the last quarter of 1995 confirm both that the PC business is increasingly dependent on consumers and, strangely, that many PC suppliers aren't yet prepared to compete profitably in the long term in the consumer segment. As a result of inappropriate pricing, cost structures, product design, and marketing, the industry is starting to run into some serious resistance to further high-growth penetration in the consumer market.

For a continuation of the consumer-fueled high growth of the last several years, things must change. The Wired Consumer era will transform the PC market.

**Increasing Dominance/Influence of the Consumer PC Sector.** For the past four years, consumer purchases of PCs have been the engine of dramatic growth in the PC market, driven by the work-at-home segment, multimedia applications, and most recently, the Internet. In 1995, more than 40% of United States unit shipments were to the home. IDC forecasts that by 2000, 60% will be to the home. And by 2010, as much as 80% of shipments will be to consumers.

In the parts of the world in which the business community has yet to embrace the PC, like Japan, the consumer percentage will likely lag during the next five years. The fundamental assumption is that starting with the United States, and spreading through the developed economies over the next several years, the business market PC market will approach a mature market growth profile, while the home market will be still relatively untapped.

The emergence of a flood of attractive entertainment, education, and home productivity services on the Internet (or its successors) in the coming decade

## Top 20 North American IT Suppliers, 1978 and 1994

| 1978 | Rank | 1994 |
|---|---|---|
| IBM | 1 | IBM |
| Burroughs | 2 | Hewlett-Packard |
| NCR | 3 | Digital Equipment |
| ~~Control Data~~ | 4 | AT&T (incl. NCR, excl. net svcs) |
| Sperry Rand | 5 | **Compaq Computer** |
| Digital Equipment | 6 | EDS |
| ~~Honeywell~~ | 7 | **Apple** |
| Hewlett-Packard | 8 | Unisys (Burroughs/Sperry) |
| ~~Memorex~~ | 9 | **Sun Microsystems** |
| ~~Itel~~ | 10 | **Microsoft** |
| ~~TRW~~ | 11 | Xerox |
| ~~Data General~~ | 12 | **Dell** |
| ~~Amdahl~~ | 13 | **Seagate** |
| ~~Storage Technology~~ | 14 | **Quantum*** |
| ~~ADP~~ | 15 | Computer Sciences |
| ~~3M~~ | 16 | **Gateway 2000** |
| ~~Northern Telecom Systems~~ | 17 | **Packard Bell** |
| Computer Sciences | 18 | Computer Associates |
| Xerox | 19 | Andersen Consulting |
| EDS | 20 | **Conner Peripherals** |

**Boldface** = Companies that emerged in the "PC Wave"
~~Strike-through~~ = Companies that fell out of the top 20
* Quantum aimed at the mini market, but refocused in the late 1980s.

*Source: International Data Corporation, 1996*

will further consumer demand. We see no reason why the PC with appropriate granularity of pricing and function wouldn't achieve the deep penetration of, say, the telephone. In the United States, for example, more than 94% of the 90-plus million households have an average of 2.8 telephones. Of the 35% to 40% of U.S. homes that have a PC (over one-half of which are used sometimes to heavily for work purposes), there is a penetration of only 1.2 PCs per household. The consumer segment has the potential, therefore, to be on a fast ramp for the next 5 to 10 years.

**More "Consumer-Friendly" PC Pricing.** The growth we envision presumes that the PC supplier community will shift strategies to exploit the consumer sector potential. One, although not the only, factor that will be key to success is the development of product designs and cost structures that allow for more consumer-friendly price points. Very

few consumer electronic devices have sold in large numbers at price points over $500.

Driving a multimedia PC entry price down to $500 from today's $1,500 is a tall order, but we believe that to tap into a broad base of consumers, suppliers must at least drive below the $1,000 threshold within the next several years. IDC believes that the industry should be exploring changes in the product and business cost structures as well as pursuing alliances with businesses that have an increasing interest in subsidizing consumers costs of purchasing a PC (e.g., banks, publishers, retailers with online services, and communications companies selling network access services).

**Increasing Variety of Consumer Network Interface Devices.** In the online home of the wired consumer, there will certainly be a wide range of devices capable of retrieving, displaying, communicating, and storing multimedia information. Today's talk about "Internet appliances" just scratches the surface. Although the PC is virtually the only device (aside from a telephone) that a consumer would use to access online services today, IDC envisions that in the next era of IT 30% to 60% of such consumer devices will be niche or limited-function devices designed to hit a particular (low) price point or (small) form factor.

The wide range we have on our estimate means that we have significant internal debate over this general-purpose vs. niche device issue. There is consensus, however, that at least 30% of the device shipments will be of the niche variety by the early-to-mid 2000s. This means that PC suppliers that do not get more oriented toward the lower end of the consumer electronics business model will miss out on a large and important part of the growth market.

## Other Important IT Business Model Changes in the New Era

The increase in scale of the IT marketplace in the Wired Consumer era will have profound changes on the IT marketplace. We've already talked about the following:

- The potential for change in IT leadership
- The increasing business process integration and IT spending in corporate ranks
- The new requirements in the PC market

**Locus of IT Innovations.** The online home and the wired consumer are becoming the new locus of IT investment and innovation. In the last 15 years, the business desktop replaced the data center as the focal point for investment and the target of most IT breakthroughs. The reason, of course, is that as the Front-Office era moved along, more money was spent in the PC/LAN area than in the data center.

And as mentioned above, the innovations that flowed out of the success of the PC world (including microprocessors, object-oriented software, small form-factor storage devices, and local area networking) have also come back to change the products of the Back-Office era: mainframes that use CMOS microprocessors, large-scale disk subsystems that use 3.5ó Winchester disks, data center management tools that use object technology and GUIs, and an acceleration in price/performance curves.

In the Wired Consumer era, already in its early years (as evidenced by the consumer effect in the PC market), the business front office is being replaced by the home as the locus of innovation. This shift has already begun: multimedia PCs, the rollout of the Pentium processor,

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## Coming Changes in the IT Industry

| | Back-Office | Front-Office | Wired Consumer |
|---|---|---|---|
| Locus of IT innovation | Data center | Business desktop | Home/consumer |
| Distribution channels | Direct | Direct–>indirect | Indirect–>direct |
| Software licensing | Big-ticket, rental | Small-ticket, purchase | Mix of purchase, nano-rental |

*Source: International Data Corporation, 1996*

and the Windows 95 rollout are all examples of where the consumer market has led the business market in technology targeting and adoption. As the coming decade unfolds, this will become the rule.

The primary mission driving product developers in the highest-growth segments of the IT industry will be answering the following question: How can we broaden and accelerate the use of information technology by consumers? As with the last industry transition, the innovations that come from the consumer marketplace will transform the IT that is available to and used by the products and suppliers serving the business world. In one prominent example, business PC price points and functionality will converge with those of the more advanced (yes) home PCs. And consumer-driven lower price points will be what allows the business community to put PCs on shorter depreciation cycles (or, eventually, expense them) allowing businesses to more rapidly exploit IT functionality enhancements.

**Distribution Channels.** Distribution of many IT products will shift to a low-cost direct model through the use of public networks. In the PC-driven Front-Office era of the past 15 years, sophisticated networks of low-cost, indirect distribution have been developed as a response to the strong shift to high-volume, low-ticket IT products. As the industry attempts to adapt to a highly price-competitive and dynamic consumer-oriented marketplace, lower-cost direct distribution through use of the Internet and other public networks will become more common and necessary. The most obvious candidates for this channel are software and information products, but we expect it to become more important for hardware as well.

**Software Licensing.** The transaction model will increasingly include rentals. Hand-in-hand with the growth of network-based distribution will be the growth (in software and information products) of revenue from transient use or rental. There will be a segmentation of transaction types based on frequency of product use and rate of change/enhancement, along a purchase-rental continuum. Products that are used constantly and/or do not exhibit a high rate of enhancement (or in which users don't want rapid enhancement) such as word processors may continue to be primarily purchased.

On the other hand, products that are used infrequently and/or are updated constantly such as information or entertainment products will lend themselves to a rental model. Suppliers of the latter class of products will greatly enhance their revenue opportunity by adding such a transaction capability to their business model.

## Summary: Incorporating the Changing IT Industry Model into Today's Strategies

A vision of the industry centered on a "wired consumer" shifting away from

the model of the last 15 years, which has had a business desktop at its center is, in our view, as fundamental to success in the next 10 years as a desktop-centric vision was to IT suppliers in the early 1980s. Companies that view the Internet/Web phenomenon as an evolutionary extension of the PC era and simply tweak their strategies and product offerings will quickly find themselves behind the IT industry growth curve.

Such behavior is analogous to that of some early LAN companies like Ungermann-Bass, which delivered great terminal servers for LANs, or Network Systems Corp., which offered excellent intermainframe networking. They embraced the new technology, but applied it in an outdated context. In contrast, companies like Novell and 3Com succeeded by understanding the new technologies in the context of a new community of users with new applications and sensibilities.

Important "new" access technologies like the Internet/Web and the important user-interface technologies under the banner of "multimedia," just like the PC and LAN in the last wave of IT growth, are creating completely new classes of users and applications. In the process, they are also creating new IT market frameworks, ones that have rules for success that are quite different from those in the preceding eras. In our view, the framework the industry is moving toward is one that is built around the vision of a networked consumer.

## The IT Industry Shifts Gears

This year's *Gray Sheet* predictions are dominated by Internet-related topics. The reason? The Internet and particularly the World Wide Web offer the greatest catalyst for change and growth in the IT industry since the PC and LAN 15 years ago. Given the far-reaching implications dawning with a IT new era, our predictions have been expanded to cover 15 intriguing, and perhaps, controversial issues.

In 1996 it will be imperative for IT suppliers to understand where the real dollars are in the Internet phenomenon. Many will conclude the money is in supporting corporate computing. However, 10 years from now, it will be obvious that the Internet's greatest commercial impact will have been in extending the reach of business directly into the home. The connection of consumers into an electronic marketplace, in effect, the creation of a community of wired consumers, will mean a quantum leap in the scope of computing and, consequently, growth in the IT industry.

## An Early Year with Strategic Importance in a New Era

In spite of our bullishness about the impact of the business-home electronic connection, we are not about to predict that 1996 will be the year of the "wired" consumer. It will take years for the "vision" of the wired consumer to fully develop into reality. Indeed, in 1996 we predict there will be a period of disappointment and retrenchment in the development of the electronic marketplace.

The most immediate evidence of that backstep is found in the high-tech stock slide of December and January, which exposed the dependence on and poor positioning for the consumer market. In January, numerous technology companies, notably semiconductor companies and PC software companies reported poorer-than-expected financial results for the previous quarter. The stock market, fearing that the great ride of the past year was finally screeching to a halt, bailed out, sending stock prices tumbling.

On the surface, there were clear reasons for the poor results, including the following:

- Faster ramp than expected for Pentium, leaving companies that bet too much on some residual demand for 486s (e.g., Cirrus, AMD) with excessive inventories

- Rapid deterioration in 4Mb memory pricing (Micron Technology et al.), with fast ramp-up of 16Mb components
- Slower uptake than expected for Windows 95, putting PC software companies (e.g., Symantec) in an awkward product transition squeeze
- Somewhat lower-than-expected consumer purchases of personal computers

Yet, in 1996, IT suppliers will be required to make pivotal decisions about how to successfully position themselves to compete in the developing wired/Internet environment. These IT suppliers will need to decide on what product and services they will (and will not) offer, what price points they must drive toward, and who their customers are, and who their most dangerous competitors really are and in the process, shape their company's identity and destiny in the new era.

## 1996 Predictions for the IT Industry

The year 1996 will be a pivotal early year in the industry transition to the Wired Consumer era. In this era, from 1996 through 2010, the stakes will be quite high, as evidenced by the following forecasts:

- IT industry revenues will jump from $500 billion to more than $2.5 trillion.
- Corporate spending on IT will rise from 2.0–2.5% of revenues to more than 5%.
- Eighty percent of PC shipments will be to the home market.
- The number of "wired" (i.e., online) users will rise to more than 1 billion.
- Online commerce volume will hit $150 billion by 2000, more than $1 trillion by 2010.

The coming year will be a key step in this progression, as leaders in the IT industry lay the strategic groundwork to respond to the growing influence of consumer computing and online presence. The suppliers that do not begin to prepare for these changes in 1996 will be frozen out of the next era's growth. The following predictions suggest how the industry at large, key industry segments, and some major suppliers will fare as the new era rolls in:

1) **The Internet "hangover" *will settle* in 1996/1997.** In 1996, and lingering into 1997, the Internet/World Wide Web phenomenon will shift from today's "intoxication" stage to a "hangover" stage. Investors and corporations will grow disappointed by the slow development of a consumer base for online commerce and less-than-stratospheric financial results from the high-flying Internet suppliers (e.g., Netscape — do we even have to bother predicting lower-than-expected results for 1996?), and the technical capabilities of the Internet will be stretched to the breaking point.

By this time next year, 20% of the Fortune 500 companies that have commercial Web sites will have stabilized or closed them. This is not to say that Web investments will wane. On the contrary, as a subset reassesses its commitment, another 175 to 200 companies will jump on the bandwagon. The net effect is that in 1996 major corporate presence on the Web will jump from one-third to two-thirds of the Fortune 500. Thus, growth in online subscribers will continue to be very strong, but there will be an underlying high turnover rate as users who are underwhelmed by the 1996 content on the Web cancel and turn on their TVs.

2) **It's "wheat-from-chaff" time for business on the Web.** Even though the marketplace is suffering a hangover, 1996 will be a strategic investment year for businesses that expect to compete in the growing electronic marketplace (nearly 200 million customers spending $150 billion by 2000, according to the

IDC Internet Commerce Market Model). As noted above, some financial service companies, retailers, publishers, and others will bail out in the hangover period. In the process, they will cripple their businesses' ability to compete in the growing "virtual economy."

In contrast, the leaders in the emerging electronic marketplace will significantly increase their investments. In the process, the seeds will be sown for the creation of new leadership and the downfall of some current giants, in many industries.

3) **New consumer PC pricing dive on the horizon; rude awakening for business PC suppliers.** In 1996 and 1997, suppliers will aggressively explore new home PC designs to drive down prices of multimedia devices to between $800 and $1,000 (and less) to penetrate broader segments of the increasingly important consumer market. In light of the weak fourth quarter results, these price points must be met to sustain strong industry growth. The key to successful home penetration will be getting beyond the naive image of a "universal" home PC to a consumer market model that is highly segmented by household income, user age, and application.

With the increasing influence of the consumer market, PC vendors in all segments, most of whom are too fearful to stray from their current cost structures, will have to become better acquainted with the mainstream consumer electronics market and mentality; they will need to learn a whole new meaning of "price-competitive." Without doubt, the winners in the PC business in the coming decade will be those that crack the mass-market price barrier, and those suppliers are likely to be the ones that, in 1996, are most aggressively pushing the price/function barrier. The losers will be those who did not see the coming of a shift to a highly segmented home PC market, with price points in the hundreds of dollars, or who were simply unable to react to the emergence of this new market.

Given the points above, we wonder if Digital's and Apple's recent announcements to de-emphasize the low end of their product lines might in fact be major strategic errors if they intend to stay in the PC business.

4) **Internet appliances quickly become commodities/giveaways.** Internet appliances will arrive in 1996, but the successful ones will not be priced at $500! Appliances will come out of the gates priced between $100 and $300 in 1996. The game-console crowd is already slicing away at the pricing for simple Web-surfing devices. By this time next year, Internet appliances will be available at half the price envisioned by PC makers: in 1996, we expect Sony to deliver a $249 Playstation that supports Internet access. In Japan, Nintendo and Sega have already announced $100 Internet adapters for their game consoles. Within two years, they will emerge as giveaways (less than $100 to free) by businesses that want customers to access their online services.

5) **Brutal price competition in data to the home.** High-performance Internet access (ISDN or better speeds) will be delivered to the home for as little as $15 to $20 per month in 1996, down from $25 to $70. Pricing will drop to $10 to $15/month within the next two years. There will be one major driver: cable companies (with the help of affordable cable modems) playing the Internet card as their first foray in the telecommunications business. Cable will not be alone, of course, because telephone companies will respond with more aggressive ISDN pricing. A wild card in the local access picture: How quickly and aggressively will the long-distance carriers enter the competitive mix?

6) **Online services shift from content to access.** Online information "content aggregators" (e.g., CompuServe, AOL, MSN, Prodigy) will derive more than one-half of their revenue from providing access to the Web by mid-1997. Two of these four will struggle to make

it through the transition. The long-term survivors among the four major online service providers would be the ones that reoriented their service so much toward the Internet. For example, more than 20% of AOL subscriber hours are spent surfing the Internet/Web. Add to this the estimated 5% to 10% of subscriber hours spent reading/composing/sending e-mail that travels over the Internet, and AOL already has 20% to 30% of subscriber business that is Internet access related.

7) **Network-centricity and multimedia interfaces mean a shake-up in application software and application development tools markets.** Look for the leaders of the next generation of application software and application development tools to be those that support seamless connections to the Internet and the creation of interactive multimedia interfaces, particularly via Web-focused technologies, by YE96.

Many of the current leaders in client/server development tools and applications are shell-shocked by the sudden emergence of the multimedia-rich Web. Many of them had just caught up with the need to support the PC and client/server worlds! The emergence of the Web and the growing importance of entertaining, multimedia-rich interfaces will challenge the current crop of client/server tool suppliers like Microsoft, Powersoft, Dynasty, Forte, and Seer, as well as application package companies like SAP and PeopleSoft.

8) **Large systems become "politically correct." High-end servers will increasingly be required to scale to support** direct access by thousands to potentially millions of users, as opposed to today's hundreds to thousands of corporate users. This will increase the pace at which parallelism emerges. This accelerated scaling requirement will also put pressure on Microsoft's enterprise strategy, because of NT's relatively low-end design point, and boost the Unix camp's high-end business. Beneficiaries will be HP, Sun, IBM, and, perhaps, a rejuvenated Digital. In 1996, NT will continue to gain share over Unix in the server space as NT takes share in the workgroup server market, but the long-term vision of NT "killing" Unix looks more and more improbable.

9) **Software licensing supports network access and short-term "rental."** Software pricing options will expand to include "transient" network-delivered rentals within the next 18 months. Even the most consumer-oriented software suppliers do not yet know what to do about charging for occasional use of software over a network. Yet, the ability to support that model will allow suppliers to increase their business volumes dramatically in the coming decade. Behind the scenes, suppliers are currently exploring how to "crack the code" on this charging model; as noted above, the leaders will begin experimenting in the marketplace in 1996 and 1997.

10) **Opening corporate databases to customers will be a key opportunity in 1996.** The first strategic wired consumer application will be providing online customers the ability to directly access data account information or product information, for example. Database and data access suppliers will succeed by providing tools that bridge corporate databases and the Web, provide simple and appealing graphical/multimedia navigation tools, support strong data security capabilities, and integrate with customer service systems.

11) **The near-term dollars in the Internet/Web will be in the business computing market.** Most corporate investment in Web browsers, servers, and development tools for the next several years will be focused on development and enhancement of internal corporate systems (i.e., systems whose users are employees) and business-to-business systems. This should not be a surprise to anyone; the corporate

world is already networked and highly penetrated with PCs, and many of the projects that will be created around the Internet have already been conceived in the context of "client/server" technologies.

The Internet/Web offers a new base of technologies with lower costs than earlier client/server tools, and it provides answers to problems of network access, platform incompatibilities, and ease of interface. The emergence of the Web will loosen up a backlog of projects previously deemed too expensive or complex. This will create an excellent opportunity for those suppliers that have both Internet-relevant product and strong distribution channels to the corporate market (e.g., Oracle, Hewlett-Packard, and IBM).

12) **But suppliers who do not see and quickly adapt to the growing consumer impact will shake out.** The Internet's capability to harness a growing base of consumers will drive the consumer-centric third wave of IT industry growth. This Internet-driven growth will require new products and services, new price points, new customer bases (in the home and corporate world), new "killer apps," new mechanisms for distribution and transaction, and new vision. Winning suppliers will be found among those that stretch to meet the aggressive new business model and metrics required in a consumer-centric market.

The vendors that embrace the new technologies, but not the changing business model, will be uncompetitive in the coming decade. A prominent example: Lotus's embrace of an obsolete business model not inferior technology is the primary reason that Notes is likely to be bulldozed by the Internet phenomenon in 1996.

13) **Microsoft will have a great year in 1996, but its hold will be challenged by the Internet-based "revenge of the (Unix) nerds."** Who would have thought a prediction that Microsoft will do very well in 1996 would go against the grain of conventional wisdom? No kidding. One effect of the Internet phenomenon of 1995 has been that many on Wall Street and within the IT industry now are forecasting the undoing of Microsoft's hold on the industry and hailing the rise of Netscape and Sun as the new industry leaders.

We recognize the potential of the Internet world to weaken several of Microsoft's key levers on the industry (such as OLE and Visual Basic), but there will be relatively little revenue effect from this in 1996 although analysts' anticipation of 1997 and beyond may pressure Microsoft's 1996 market value.

In 1996, things look good for the industry's new underdog. First, Microsoft has lots of desktops to upgrade to Windows 95 and Office 95 in 1996. Furthermore, at a strategic level, Microsoft in 1996 is looking smarter than, say, IBM between 1981 and 1985. Microsoft appears to be quickly jumping onboard the Internet standards bandwagon, positioning itself to cash in on the Internet rather than fight it. Microsoft also is among the IT suppliers most alert to the consumer-centric nature of the next wave. However, 1996 will be critical for Microsoft as it lays some heavy bets that will start affecting the company heavily in 1997 and 1998. Key questions in 1996 include the following:

- Will Microsoft follow through with a full-or half-hearted embrace of Internet standards? (Its earlier embrace of open standards, for example, was very limited.)
- Is the consumer division savvy enough to take the market lead?
- Will the Microsoft network survive? Is this analogous to IBM's Satellite Business Systems, ROLM and, yes, Prodigy's bold but largely unsuccessful ventures into strange new worlds?
- Does Microsoft's ventures into new content realms, including its partnership with NBC News,

represent the company (expensively) attempting to reach beyond its grasp?

- Can Microsoft really grow up into the enterprise/infrastructure space, particularly if NT cannot scale to where corporations need it to be?
- How well will Microsoft respond to the inevitable burden of a highly successful company: supporting the ever-growing demands of a larger and larger legacy base?

Two additional Microsoft predictions for 1996:

- In spite of the recurring rumors of Department of Justice investigations, Microsoft will escape any major antitrust activity in 1996 (an election year).
- Microsoft will conclude that some of its ventures into new businesses will have a greater chance of success without the Microsoft brand.

14) **A growing opportunity for IT servicers in the corporate market.** Understanding and articulating business needs of their internal customers does not come naturally to many IS managers. As the Wired Consumer era requires corporations to build interesting, entertaining systems that their customers directly use, the internal, technology-oriented focus of the IS organization will be even more of a liability. In 1996, look for business units to look to outside servicers even more frequently for designing, building, and maintaining systems that reach out to the wired consumer.

15) **The door closes on the losers of the PC/LAN (second wave) wars.** In 1996, as the wired consumer era continues to shift into place, the suppliers (and products) that lost the market share battles of the last era or have not developed strong strategies for evolving into the next era will be prime acquisition targets or spin-off opportunities. The most prominent (and least surprising) examples: Apple, Borland, Novell, IBM OS/2, Lotus SmartSuite, Sybase, and Gupta. Some of these companies and products (e.g., Apple) have very strong capabilities and assets, but we believe they are in need of significant refocus, most likely to occur in a different organizational context.

16) **The increased scope of the Net will favor suppliers that excel in creating virtual organizations.** The second wave of the IT industry, catalyzed by the wide availability of PCs, tapped into a wellspring of creativity and innovation in the marketplace. The ubiquity of these powerful thought tools throughout the large and small business community resulted in an unprecedented flood of new IT products and services. The fact that no large vendor can out innovate an army of entrepreneurs made obsolete the traditional closed and vertically integrated business structure, of the first wave. Successful suppliers today are those that can play well in a virtual organization structure that is, suppliers that are able to act as creator, investor, producer, and/or partner. In the third wave, the Wired Consumer era, the ubiquity of network access and mass market PCs will accelerate the democratization of innovation and creativity in the IT industry. The suppliers that have structured themselves to play well with others in the second wave will need to put even more emphasis on joint product development, seeking out freelance talent, production skills, and supporting a wide variety of partnering structures. Suppliers that still struggle with partnering will find the going very difficult in the new industry model.

17) **In the excitement over the Internet, many companies will make questionable acquisitions.** In the excitement generated by a new growth market, businesses often rush in to decisions that do not make much sense. We will see a lot of that in the Wired Consumer era. A recent example is the investment in MECA Software (developer of Managing Your

Money) by First Bank System, Fleet Financial Group, Royal Bank of Canada, Bank of America, and NationsBank. What proprietary edge these banks hope to gain by private labeling a package that badly trails Quicken and Microsoft Money in the marketplace, and in the process limits customers' choices of financial package, is hard to imagine. The more appropriate approach is that of First Chicago, and most other banks coming online supporting users' choice of either Quicken or Microsoft Money. The banks that own MECA will not be alone, however. As the electronic marketplace builds up steam, many companies, in and out of the IT industry, will buy into businesses that they do not have much to do with and are better off without. In 1996, there will be lots of opportunity to debate the merits of these and many other strategic investments.

## Conclusion

That concludes our predictions for 1996. Our chief purpose, of course, is to stimulate some thoughtful discussion around what we believe are the greatest areas of opportunity and uncertainty for the IT industry in the next several years. We expect that some of these predictions will generate serious disagreement and debate. Whether you agree or disagree, we welcome your views and insights.

Please share them with us via e-mail at fgens@idcresearch.com.

THE GRAY SHEET

# Computer Industry REPORT

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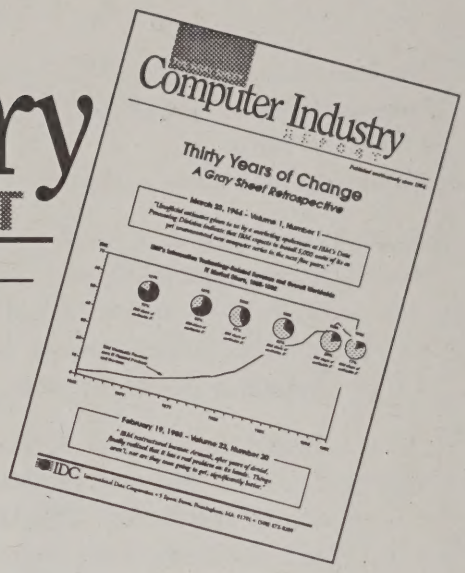


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The Gray Sheet — Special Edition

# Computer Industry Market Review and Forecast, 1994–1999

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*Analyst: Ted Julian*

October 1995

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# Abstract

## The Gray Sheet — Special Edition: Computer Industry Market Review and Forecast, 1994–1999

*The Gray Sheet — Special Edition* provides a segment-by-segment review and forecast for the U.S. computer industry. Not only does it include basic market data (like unit shipments and revenue) for most segments of the IT market covered by IDC, but it also reports on the latest market trends.

More specifically, *The Gray Sheet — Special Edition* is composed of four sections: systems, software, networking, and services. Each segment includes IDC's latest five-year forecast for revenues and unit shipments (in most cases). Furthermore, each section contains analysis of the key issues and trends that are shaping the market. The four primary sections are covered as follows:

- *Systems* — personal computers (PCs), PC servers, and multiuser systems
- *Software* — primary markets (application solutions, system-level software, application development tools) and PC operating systems
- *Networking* — hardware (network interface cards, routers, hubs, and backbone switches) and software (LAN operating systems and TCP/IP)
- *Services* — system support, outsourcing, systems integration, consulting, and training and education.

# Executive Summary

The information technology (IT) market in the United States expanded by a robust 10.3% in 1994 over 1993, a surprisingly strong showing and the third consecutive year the U.S. market has substantially outgrown overall worldwide IT market growth (worldwide 1993–1994 market growth totaled 7.5%). Exceptional increases in PCs, servers, and networking was countered by the slower growth in services and a declining multiuser system market.

The 1991–1994 explosion in IT spending in the United States represents perhaps the most prosperous time in the IT industry, even as major industry players (Digital, Groupe Bull, NEC) suffered through some of their leanest years. The emergence of Microsoft from powerhouse to new-age phenom has eclipsed the steady — and often spectacular — growth of a host of suppliers from Oracle, SAP, and Sybase to Compaq, Bay Networks, Hewlett-Packard, and Packard Bell.

In many ways the industry is at its most healthy state in years. Supplier strategies based on vertical integration and weakened by a lack of focus have given rise to an industrywide obsession with specialization — in relation to specific market segments, specific technologies, and precise customer needs. Today's leading suppliers are more efficient than ever before: they offer better products built more quickly and delivered through the least expensive channels. The following results speak for themselves:

- Approximately 18.7 million PCs were shipped in 1994, representing 24.3% growth over 1993. Revenues were also strong, up 28.4% from 1993 to $38.7 billion. Compaq grabbed the number one spot in the United States in 1994, vaulting over both IBM and Apple, which had held the number two and number one positions, respectively, both in 1992 and 1993. As a result, Apple was bumped to second place while IBM actually fell to number four as Packard Bell grew to claim the number three position (from fourth in 1993). Hewlett-Packard clinched the number ten spot, bumping Groupe Bull/ZDS out of the top ten.
- The PC server market experienced remarkable growth, increasing 57.0% in 1994 over 1993 in U.S. shipments and 33.0% in revenues (to 225,000 units and $1.5 billion). Fueled by ongoing corporate investment in LANs (for downsizing, LAN-based applications, etc.), the U.S. PC server segment will generate nearly $4.5 billion by 1999, representing 19.6% compound annual growth since 1994.
- After several years of declining revenues, the multiuser systems market is starting to rebound. In 1994, U.S. multiuser system revenue was nearly $19.8 billion, an 8.1% drop from 1993. Through the end of the decade, however, revenue should increase slightly, hitting $22.3 billion in 1999.
- In 1994, fueled by pent-up demand, traditional workstation unit shipments worldwide grew by 19.0% to 618,550, while revenues expanded 5.0% to nearly $10 billion. Thus, although the average

system price fell by 12% to $15,800, this decline was more than offset by increased volume.

- From a base of $35.2 billion in 1994, the U.S. software market will achieve year-over-year revenue growth in the low-to-mid teens, reaching $71.1 billion in 1999. Of the three primary software markets — application solutions, system-level software, and application development tools — application solutions is the largest in terms of U.S. revenues and will remain so through 1999. However, the fastest-growing segment is application development tools, with U.S. revenue growth in the mid-to-high teens through 1999.

- Microsoft will ship nearly 20 million Windows 95 licenses in 1995 — 15.7 million with new PCs and 4.2 million as upgrades. Cast in this light, it is hard to view Microsoft's Windows 95 rollout as anything but a success.

- From an impressive base of more than $9.1 billion in 1993, the LAN hardware and software market will expand to a whopping $15.4 billion in 1998, a compound annual growth rate of 11%. Not only is this growth driven by the ongoing penetration of LANs into large businesses — as they continue to grow, extend, and upgrade their networks — but also by the implementation of LANs in small and medium-sized businesses (and even in some homes and home offices).

- The LAN OS market grew 19% in terms of licenses, but decreased 4% in end-user sales value due to strong pricing pressure and a general transition to lower-priced products. During 1994, 1.0 million PC LAN OS licenses, representing 19.5 million PC nodes, were shipped worldwide. The dollar value of the licenses shipped in 1994 was $2.36 billion, down from $2.46 billion in 1993. Growth is expected to slow in the United States after 1997 with new license sales flat during 1998 and 1999. By 1999, IDC forecasts that 180 million PCs (installed) will be running a network operating system and that the dollar value of PC network operating-system shipments will exceed $3.8 billion.

- From 1993 to 1994, global spending for outside services grew 9.4%, reaching nearly $63.0 billion. The U.S. services market will grow to a whopping $102.0 billion in 1998. Within that bulk are dozens of smaller and well-defined niche markets. IDC carves the IT services pie into five broad parts: operational services, maintenance and support, implementation services, planning services, and training and education. The maintenance and support category has always been the largest and will remain so through 1998, growing from U.S. revenues of $26.6 billion in 1994 to $31.9 billion in 1998. Maintenance and support has also had flat growth for some time, though, and is actually the slowest growing of the service activities. High-growth IT services categories include operational services and planning services.

How long will the expansion continue? Is there really room for five or ten more years of double-digit growth? Will the bubble burst, or is this just the beginning?

The outlook for growth in most segments of the U.S. IT market remains impressive, even despite its awesome size (see Figure 1). IDC expects that the U.S. market will account for a growing proportion of overall worldwide IT consumption through 1997. IDC bases its bullish outlook on the following factors:

- No single consumer product, market segment, or even consumer phenomenon has attracted more enduring attention over the past 12 months than the Internet (that is, if you exclude the Win95 hype). The Internet is changing the way both business and personal life is conducted around the globe: for many, e-mail is no longer just an option for interpersonal communication. A huge majority of consumer-goods companies are racing to enhance their Web-based marketing and communication efforts. Web-based "virtual" money, advertising, and communities threaten to alter the stability of their real-world analogs.

- The booming home-computing market looms large, eclipsing the corporate segment in growth and perhaps even in sheer size someday. The fate of many IT (and some non-IT) market segments will be determined by the number of families that purchase PCs and the extent to which that purchase fuels (or enables) the consumption of other goods and services.

- Over the past few years, much vendor and market activity has centered on the desktop and at the server. Workgroup computing represents the powerful merging of the two and thus enables next-generation productivity gains. In some eyes IBM's over-$3 billion investment in Lotus Notes is ample justification for the importance of workgroup computing efforts.

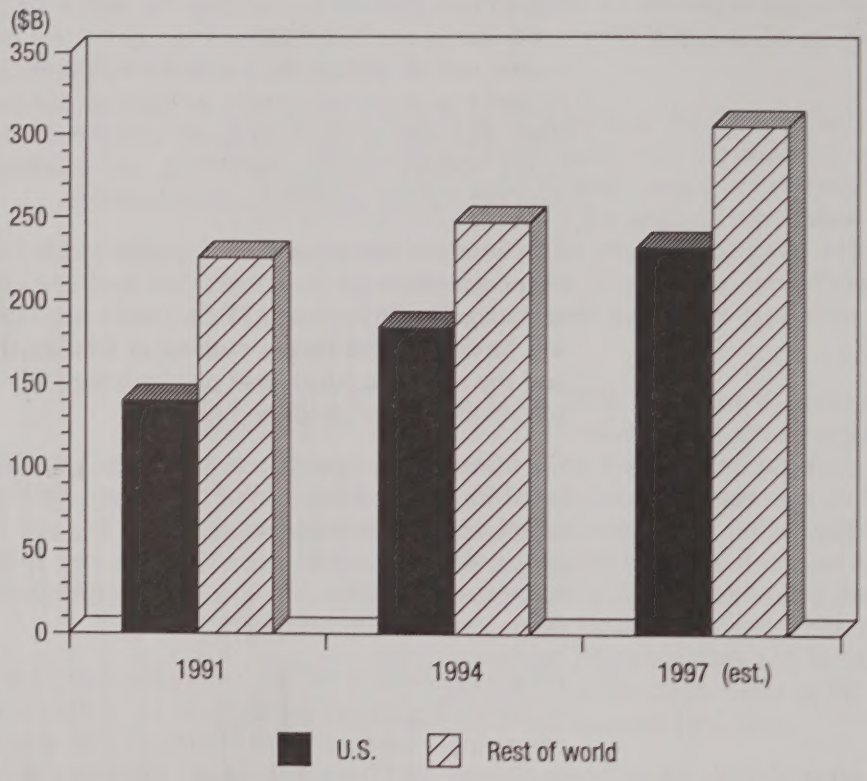
- Although client/server has been a buzzword for years, we are still in the early stages of its adoption. In conjunction with workgroup computing, client/server architectures represent a next-generation application of IT, through which customers hope to better leverage their IT investments to achieve enhanced productivity and reduced costs. If workgroup computing can be thought of as the desktop (applications) moving to the network, then perhaps client/server represents the network coming to the desktop.

- As the IT industry and its technologies have evolved, so has MIS. The result is that IT vendors can't necessarily reach MIS using the same techniques as in the past. At many companies, MIS departments are more strategically focused than ever, either because they've grown up, they're bigger, or they've outsourced routine/mundane activities they used to do themselves. Some MIS departments are no longer simply cost centers within their organizations — they act more like separate business units and bill for their services. Changes of this nature require IT vendors to rethink how they sell to MIS.

*The Gray Sheet — Special Edition* report presents IDC's latest ing on nearly all IT segments. The report analyzes the overall I ket in four segments (systems, software, networking, and service offers IDC's latest forecasts as well as analysis of the trends af each of these industries.

**Figure 1**

**U.S. Proportion of Worldwide IT Spending for 1991, 1994, and 1997 (1994 exchange rates)**




Source: International Data Corporation, 1995

# Methodology

*The Gray Sheet — Special Edition* is based on analysis and data generated in IDC's U.S. technology research programs. Analysts in these programs are responsible for tracking the latest developments in all major IT market segments in the United States. This report presents a comprehensive overview of this research in systems, software, desktop, communications, and services markets.

This report has been compiled from the work of IDC analysts by the staff of IDC's bimonthly industry newsletter, *The Gray Sheet.* IDC analysts rely on three basic sources for collecting the data in this report and for completing their forecasts for analysis of the latest developments in the markets they follow — end-user interviews, supplier interviews, and publicly available data as follows:

- End-user interviews — IDC conducts thousands of end-user interviews and surveys in the Unites States every year. These surveys and interviews focus on identifying current spending levels, identifying new spending patterns, and evaluating customer interest in new IT products and solutions. IDC's annual *Global IT Survey* was launched in the United States in 1990 and remains the single largest IT industry research instrument.

- Supplier interviews — IDC is in regular contact with virtually every supplier of IT products in the United States throughout the year. IDC analysts provide feedback on likely market acceptance of new products and regularly review new business plans and practices. During the course of this process, IDC gains invaluable insight into market directions and developments. In addition, IDC regularly solicits the comments of all major suppliers on the industry models and quarterly data that are developed in each major IDC technology research program area.

- Publicly available data — IDC's forecasts and analysis rely on a variety of third-party sources, including, but not limited to, public documents such as company annual and quarterly financial reports; press releases; discussions with Wall Street analysts; government economic data; and academic and private economic and industry analyses. These data often provide an excellent means of placing IDC's estimates and forecasts in the appropriate context.

Readers of IDC's annual report on worldwide IT spending, the *Worldwide Black Book*, may notice some minor differences from *The Gray Sheet — Special Edition*. Data in these two reports differ in several important ways:

- The *Worldwide Black Book* measures customer purchases of IT products in value terms only. The *Special Edition* analyzes vendor performance in revenues and unit shipments, where appropriate.

- The *Special Edition* focuses exclusively on the United States. The *Worldwide Black Book* presents data and analysis on more than 40 worldwide IT markets, including the United States.

- In attempting a comprehensive portrait of country-level IT u the *Worldwide Black Book* details IT penetration rates and ket forecasts for national economies spending at least $200 lion a year on information technology. The *Special Ed* focuses on supply-side successes and failures in the United S IT market.

For more information on the *Worldwide Black Book*, contact D Bellomy at 508-935-4336 (or dbellomy@idcresearch.com). For information on *The Gray Sheet — Special Edition*, contact Ted J at 508-935-4237 (or tjulian@idcresearch.com).

# Related Research

## Systems

*1995 Processor Databook* (forthcoming, fall 1995)

*Worldwide PC Forecast Update, 1995–1999* (IDC #10412, September 1995)

*Worldwide Workstation Forecast, 1993–1999* (IDC #10368, August 1995)

*Worldwide Workstation Census: By Vendor, by Model, Yearend 1994* (IDC #10032, August 1995)

*1994 Worldwide Midrange Market* (IDC #9711, February 1995)

*Analysis of the LAN Server Marke*t (IDC #9640, March 1995)

*1994 Large Systems Year in Review: The Mainframe Makes a Mini Comeback* (IDC #9610, January 1995)

## Software

*Advanced Operating Environments, Forecast for 1993–1998* (IDC #10472, October 1995)

*The Windows NT Market, 1994–1999* (IDC #10471, October 1995)

*1995 Worldwide Software Review and Forecast* (IDC #10460, fall 1995)

*System Software: 1995 Worldwide Markets and Trends* (IDC #10459, fall 1995)

*System Management Software: 1995 Worldwide Markets and Trends* (IDC #10458, fall 1995)

*Object Technologies: 1995 Worldwide Markets and Trends* (IDC #10457, fall 1995)

*Application Development Tools: 1995 Worldwide Markets and Trends* (IDC #10456, fall 1995)

*Geographic Information Systems: 1995 Worldwide Markets and Trends* (IDC #10455, fall 1995)

*Information Access Tools: 1995 Worldwide Markets and Trends* (IDC #10454, fall 1995)

*Electronic Design Automation: 1995 Worldwide Markets and Trends* (IDC #10453, fall 1995)

*Mechanical CAD/CAE/CAM: 1995 Worldwide Markets and Trends* (IDC #10452, fall 1995)

*Vertical-Industry Applications: 1995 Worldwide Markets and Trends* (IDC #10451, fall 1995)

*Cross-Industry Applications: 1995 Worldwide Markets and Trends* (ID #10450, fall 1995)

*The Market for RDBMS Software for Unix and AOE, 1994–1998* (ID #10387, September 1995)

*The Spreadsheet Software Market Review and Forecast, DOS, Wi dows, OS/2, and Macintosh, 1994–1999* (IDC #10238, fall 1995)

*The Word Processing Software Market Review and Forecast: DOS Windows, OS/2, and Macintosh, 1994–1999* (IDC #10158, fall 1995)

*PC Operating Systems Market Review and Forecast* (IDC #10048, Jul 1995)

*The PC Single-User Database Market Review and Forecast: DOS, Win dows, OS/2, and Macintosh, 1994–1999* (IDC #9851, March 1995)

*The Desktop Integrated Software Review and Forecast: DOS, Win dows, and Macintosh 1994–1999* (IDC #9797, March 1995)

*IDC Software Market Taxonomy and Report Guide* (IDC #9758, March 1995)

## Networking

*PC LAN Operating Systems: The Foundation for Client/Server Comput ing* (IDC #10256, September 1995)

*1995 PC NIC Market Forecast, 1994–1999* (IDC #10000, May 1995)

*1995 Open Networking Directions: TCP/IP Across the Enterprise* (IDC #10094, July 1995)

*Preliminary LAN Hub Market Forecast, 1995–1999* (IDC #9920, May 1995)

*1995 Router Market Forecast* (IDC #9935, May 1995)

## Services

*Successful Marketing Strategies for IT Training and Education Organi zations* (IDC #9968, June 1995)

*Empowering the Channel: Strategies for Extending Networking Ven dors' Service and Support Capabilities* (IDC #9912, May 1995)

*The Multivendor Support Market: A Competitive Analysis and Profiles of Leading Vendor Strategies* (IDC #9910, June 1995)

*1994 Outsourcing Markets and Trends* (IDC #9542, December 1994)

*System Support Services Markets and Trends by Technology Segments, 1989–1999* (IDC #9541, February 1995)

*1994 Systems Integration Markets and Trends* (IDC #9516, December 1994)

*1994 IT Consulting Services Markets and Trends* (IDC #9494, Decem ber 1994)

*U.S. and Worldwide Services Industry Overview: The Changing Role of IS and Its Impact on Service Providers* (IDC #9463, December 1994)

# Systems

## Personal Systems

Nineteen ninety-four was another banner year for PCs in the United States. Driven by forces including the ongoing consumer PC boom, accelerated corporate upgrades, and increased adoption of portables, 18.7 million PCs were shipped in 1994, representing 24.3% growth over 1993. Revenues were also strong, up 28.4% from 1993 to $38.7 billion.

Compaq grabbed the number one spot in the United States in 1994, vaulting over both IBM and Apple, which had held the number two and number one positions, respectively, both in 1992 and 1993. As a result, Apple was bumped to second place while IBM actually fell to number four as Packard Bell grew to claim the number three position (from fourth in 1993). Nineteen ninety-four was also the year that Hewlett-Packard clinched the number ten spot, bumping Groupe Bull/ZDS out of the top ten (see Table 1).

**Table 1**

**Top 10 U.S. PC Vendors, 1994**

| Rank | Vendor | Shipments (000) | Share (%) |
|---|---|---|---|
| 1 | Compaq | 2,198 | 11.8 |
| 2 | Apple | 2,153 | 11.5 |
| 3 | Packard Bell | 2,125 | 11.4 |
| 4 | IBM | 1,640 | 8.8 |
| 5 | Gateway 2000 | 934 | 5.0 |
| 6 | Dell | 787 | 4.2 |
| 7 | AST | 721 | 3.9 |
| 8 | Toshiba | 618 | 3.3 |
| 9 | Acer | 464 | 2.5 |
| 10 | Hewlett-Packard | 445 | 2.4 |
| | Other | 6,615 | 35.4 |
| | U.S. Total | 18,700 | |

Source: International Data Corporation, 1995

From 1992–1995 the PC industry has enjoyed 20%+ growth rates. Looking forward, however, we can see that such growth will be difficult to maintain. The corporate market is already primarily an upgrade market that provides steady demand as firms regularly turn over their installed base, but it will not fuel significant growth in the future. The

home PC market, which has played a major role in providing gro over the past few years, is also problematic. Although PCs have d well selling into upper-class and upper-middle-class homes, achiev comparable penetration into middle-class and lower-middle-class fa lies may prove troublesome, particularly since average system pri have remained pretty stable over the past few years. Although so vendors have tried offering sub-$1,000 systems, none have met w much success.

From 1995 to 1999, growth in the U.S. PC market will gradually sl both in terms of units and revenue. In 1995, performance will f slightly from 1994 levels to 22.6 million units (20.9% growth ov 1994) and $46.4 billion in revenue (20.0% growth over 1994). 1999, year-over-year unit growth will hit 10.3% in units, with 36.5 m lion shipped, and 6.6% growth in revenue, with $67.9 billion earn (see Table 2 and Figures 2 and 3).

**Table 2**

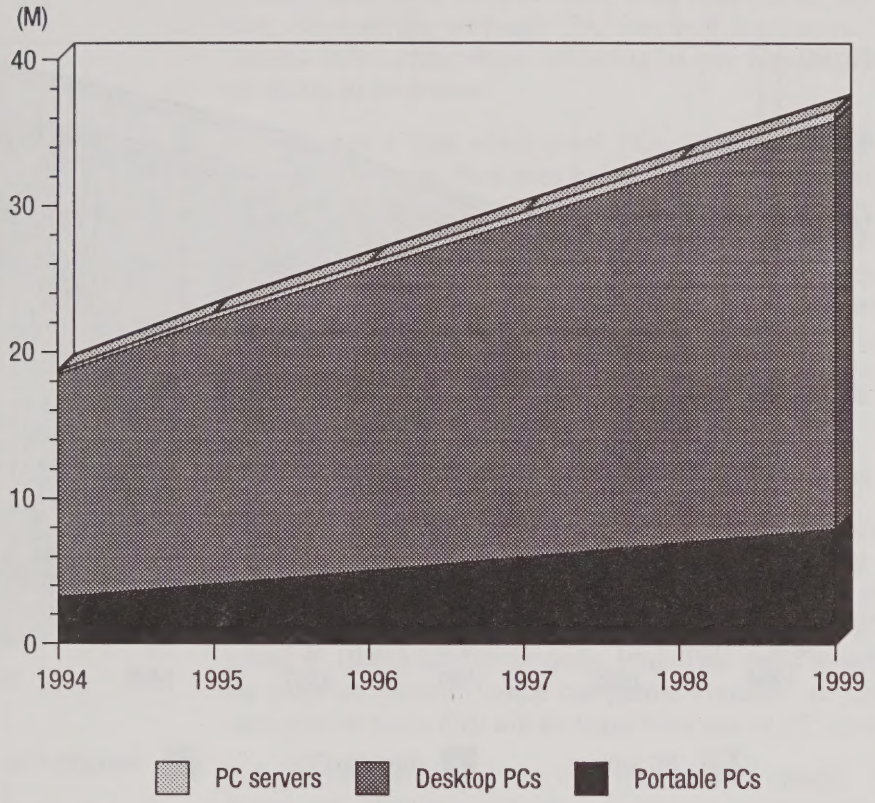
**U.S. PC Market: Shipments and Revenue, 1994–1999**

| | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | CAGR (%) 1995–1999 |
|---|---|---|---|---|---|---|---|
| Shipments (000) | | | | | | | |
| Portable PCs | 3,200 | 4,120 | 5,043 | 6,018 | 6,992 | 7,973 | 17.9 |
| Growth (%) | 26.6 | 28.7 | 22.4 | 19.3 | 16.2 | 14.0 | |
| Desktop | 15,275 | 18,158 | 20,600 | 23,024 | 25,532 | 27,897 | 11.3 |
| Growth (%) | 23.4 | 18.9 | 13.5 | 11.8 | 10.9 | 9.3 | |
| PC servers | 225 | 323 | 432 | 522 | 598 | 670 | 20.0 |
| Growth (%) | 57.0 | 43.1 | 34.0 | 20.8 | 14.5 | 12.0 | |
| Total | 18,700 | 22,600 | 26,076 | 29,565 | 33,121 | 36,539 | 12.8 |
| Growth (%) | 24.3 | 20.9 | 15.4 | 13.4 | 12.0 | 10.3 | |
| Revenue ($M) | | | | | | | |
| Portable PCs | 9,112 | 11,888 | 14,225 | 16,509 | 18,667 | 20,424 | 14.5 |
| Growth (%) | 40.1 | 30.5 | 19.7 | 16.1 | 13.1 | 9.4 | |
| Desktop | 28,074 | 32,350 | 35,136 | 38,691 | 41,039 | 42,976 | 7.4 |
| Growth (%) | 20.2 | 15.2 | 8.6 | 10.1 | 6.1 | 4.7 | |
| PC servers | 1,511 | 2,193 | 2,918 | 3,513 | 4,007 | 4,488 | 19.6 |
| Growth (%) | 33.1 | 45.2 | 33.1 | 20.4 | 14.1 | 12.0 | |
| Total | 38,697 | 46,431 | 52,279 | 58,713 | 63,713 | 67,888 | 10.0 |
| Growth (%) | 29.4 | 20.0 | 12.6 | 12.3 | 8.5 | 6.6 | |

Source: International Data Corporation, 1995

**Figure 2**

**U.S. PC Shipments by Form Factor, 1994–1999**




e: International Data Corporation, 1995

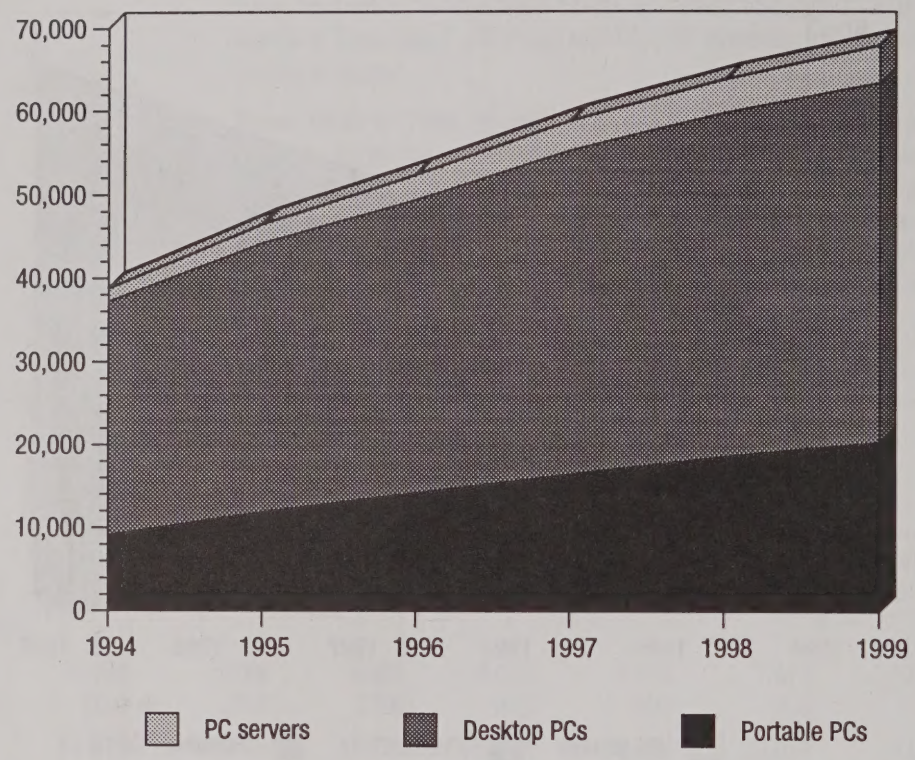
Individual vendors could defy the market's slowing growth by stealing share from one another. The PC business is perhaps the IT market's most competitive segment, and the landscape is already littered with the remains of one-time top vendors that have gone under, been bought out, or otherwise disappeared. In fact, the U.S. PC market has been consolidating for some time. In 1992, the top ten vendors accounted for 52.4% of the market, but by 1994 their dominance expanded to 64.6%.

Not only is the PC market competitive, but it is getting harder and harder for vendors to differentiate themselves. With the advent of the Pentium chip, Intel expanded its influence over the PC market via its rapidly growing motherboard business. For various reasons, even top-tier vendors who previously designed and manufactured their own motherboards are now turning to Intel for Pentium products. This represents a fundamental shift in the PC business because motherboard design used to be a major source of competitive differentiation. Now, many vendors are using the same fundamental building blocks for their offerings.

Given this trend, PC companies increasingly define themselves not by their ability to design PCs, but their ability to sell them. Under this

**Figure 3**

**U.S. PC Revenue by Form Factor, 1994–1999 ($M)**




Source: International Data Corporation, 1995

model, a vendor's distribution channel strategy and relationships, i marketing strategy, and its manufacturing prowess take on enhanc significance. This is not to say that the systems themselves are co pletely unimportant. Vendors need to equip their systems carefully ensure they are compelling for their target market and they perfor reliably (among many, many other things). However, as the moth board increasingly becomes the same across vendors, it is these rel tively nontechnical competencies that set vendors apart.

For example, Compaq did not take the number one spot in 19 because its products were leagues ahead of the competition. In fac Compaq's portables stumbled that year, costing the vendor the to position. In most other areas, however, Compaq delivered mighti The vendor did a remarkable job ramping its production, for exampl particularly given that volume grew by more than 50% year over ye In addition, Compaq's marketing message was clear and compelli across segments: for the home, Compaq focused on lifestyle comp ing; for the office, it highlighted cost/ease-of-ownership issues.

Although Packard Bell's products were excellent in 1994, they are probably not the main reason the vendor grew volume by over 100% from 1993. Instead, Packard Bell took channel management to a new level. Through its aggressive use of co-op advertising, among other things, the vendor secured more retail space than any of its competition. As a result, although IDC research has shown that many customers didn't enter stores planning to buy Packard Bell, they ended up doing so in droves.

If there was a time when great PCs sold themselves, that time has passed. Now more than ever before technology has taken a back seat to effective marketing. Over the next few years, the PC market in the United States will not expand as rapidly as it has in the past, but some vendors will continue to grow nonetheless — at the expense of others. Those that do succeed will learn to cope with the Intel juggernaut to at least some extent and differentiate themselves on largely nontechnical competencies as 1994's success stories (like Compaq and Packard Bell) already have.

### PC Servers

Many of the IT market's hottest buzzwords — downsizing, open systems, and client/server — are phenomena driven by the PC server market. Whether a cause or result of this buzzword status, the U.S. PC server market is undeniably hot with its 1994–1999 CAGR in revenues of 19.6% (20.0% in units, too). This rapid growth comes as little surprise, however, since companies continue to claim that in the next several years they will increase their use of PC server platforms.

Mere presence in this market does not, of course, dictate profits. Firms are demanding increased returns on their PC server investments in terms of new functionality, cost savings, improved efficiency, or some combination of these. Indeed, customer expectations for server platforms are at an all-time high, and as a result just selling a "box" is not enough — true solutions are required.

As impressive as the market's growth is, our numbers still understate the total opportunity. Servers, after all, are a linchpin in the network, because a successful server sale opens doors to other revenue possibilities. Nevertheless, capitalizing on this opportunity is at the same time becoming more important and more complicated.

In 1994, the PC server market experienced remarkable growth, increasing 57.0% over 1993 in U.S. shipments and 33.0% in revenues (to 225,000 units and $1.5 billion). Fueled by ongoing corporate investment in LANs (for downsizing, LAN-based applications, etc.), by 1999 the U.S. PC server segment will generate nearly $4.5 billion, representing 19.6% compound annual growth since 1994.

In the midst of heightened competition, the barriers to entry in the LAN server market are increasing. In order to deliver complete solutions, more than just hardware is required. Software expertise (systems management, ISV relationships, and ease-of-use tools), service and

support infrastructure, and cost-effective low-end solutions are k areas in which vendors need to invest in order to be successful.

## Definitions

A **personal computer** is a general-purpose, single-user machine th is microprocessor based, capable of supporting attached peripheral and can be programmed in a high-level language. These systems typ cally cost less than $8,000, but instances of higher-priced systems ar included in this category. Specifically excluded from this definition ar board-level products used in building embedded systems or upgradin existing PCs. Also excluded are single-user workstations, a categor dominated by RISC-based systems from Sun, HP, Digital, and IBM.

Current products that satisfy this definition include the following:

- Desktop, AC- and DC-powered smaller notebook, notebook, an transportable systems based on Intel and Intel-architecture (NEC AMD, Cyrix, IBM, TI) processors (8088, 8086, 286, 386SX 386DX, 386SL, 486SX, 486DX, 486DX2, 486SL, 486SLC 486DLC, DX4, Blue Lightning, and Pentium) from vendor including IBM (Aptiva, 300 and 700 and ThinkPad lines), Com paq (Deskpro/XL, Deskpro/XE, ProLinea, Contura, LTE Elite series), and hundreds of other PC vendors including Packard Bell Dell, Gateway 2000, Hewlett-Packard, AST, Digital, Acer, an Toshiba.

  Also included are single-processor PC servers that are built fro the ground up to act as servers and sold and marketed as such Examples include Compaq's ProSignia VS, ProSignia, and Pro Liant 1000; IBM's PC Server family; and Hewlett-Packard's Net Server LC, LF, and LM.

- Single-user desktop and portable systems based on either Motoro la's 680X0 series of processors (68000, 68020, 68030, 68040) o the PowerPC chip, from vendors including Apple (Macintosh PowerBook) and Commodore (Amiga).

- Low-end home/hobby computers based on proprietary "other" 8 bit processors from Apple (IIc), Atari, and Commodore (64/128).

Related products that do not satisfy this definition include the following

- Dedicated game computers (Nintendo); handheld and palmtop consumer (Atari, Portfolio, Sharp Wizard, HP 95 and 100LX) business (Newton MessagePad, Tandy Zoomer Z-PDA), and verti cal market (Tektronix) products.

- Single-user workstation products, including IBM RISC Sta tion/6000, Digital (DECstation, VAXstation), HP/Apollo (900 Series, Apollo DN), and Sun Microsystems (Sparcstation)

- Multiprocessor-based server and multiuser systems from tradi tional PC vendors including Compaq (Systempro, ProLiant), ALR (MultiAccess Series 3000), AST (Manhattan SMP), AT&T GIS (series 3400), and Wyse (9000I).

**PC Servers** are sold and marketed expressly as servers and are systems that are built from the ground up to act as servers. These systems typically have enhanced bus architectures, system management software, scalability, high-availability features, redundant hardware components, and optimized performance for the leading NOS and LAN applications. PC servers are likely to be found in larger networks. The average price for a PC server ranges from $7,500 to $8,000. Examples include Compaq's ProSignia VS, ProSignia, and ProLiant 1000; IBM's PS/2 Server 85, 95, 195, and PC Server family; and HP's NetServer LC, LF, and LM.

## Multiuser Systems

Even in the multiuser systems market, Intel has become a major — though less direct — force to be reckoned with. The chip vendor's influence is basically derived from its processor fabrication assets and prowess. Only a handful of vendors have fabrication capabilities comparable to Intel's, and even fewer that can use such resources in as cost effective a fashion. As a result, small and medium-scale system vendors (which by and large don't use Intel processors) are increasingly finding themselves in competition with less expensive Intel-based alternatives.

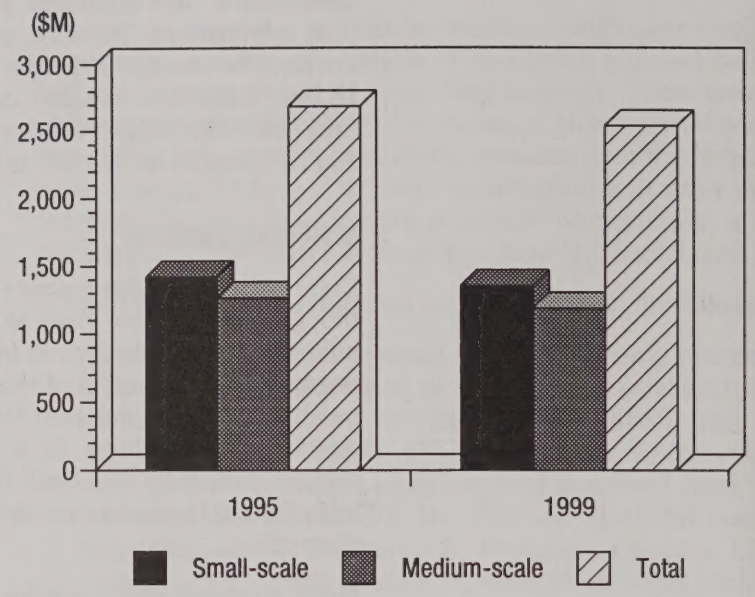
Much multiuser system-vendor activity is centered on this processor dilemma and the cost issues it raises. IBM is moving many of its multiuser systems to the PowerPC. Digital is trying to migrate its line to the Alpha chip. Large-scale vendors are transitioning to CMOS-based systems. All of these efforts are geared toward improving performance, but they also have an eye to cost: multiuser vendors not directly facing Intel today are probably competing with a vendor that is.

As important as such hardware-centric cost and performance issues are, software will likely prove to be the Achilles' heel for many multiuser efforts. In the case of large-scale systems, new CMOS-based hardware will help reduce overall system costs, but software pricing will also need to be brought in line. On the small-scale systems front, vendors need system software support if their multiprocessor efforts are to be realized. Across the entire multiuser system market, customers are demanding better systems and network management tools from everyone with which they do business.

In the end, multiuser system vendors must strike the right balance between hardware and software. And at the end of the day, what determines the appropriate mix is the utility it provides to specific types of computing tasks. Intel-based systems will not be replacing large-scale mainframes anytime soon because software support appropriate for today's mainframe environments and customers doesn't exist. Nonetheless, large-scale vendors must consider their architecture choice carefully since, although they are not facing direct competition from Intel-based systems, they are facing midrange vendors that are (see Figures 4–7 for platform revenues by size class).

**Figure 4**

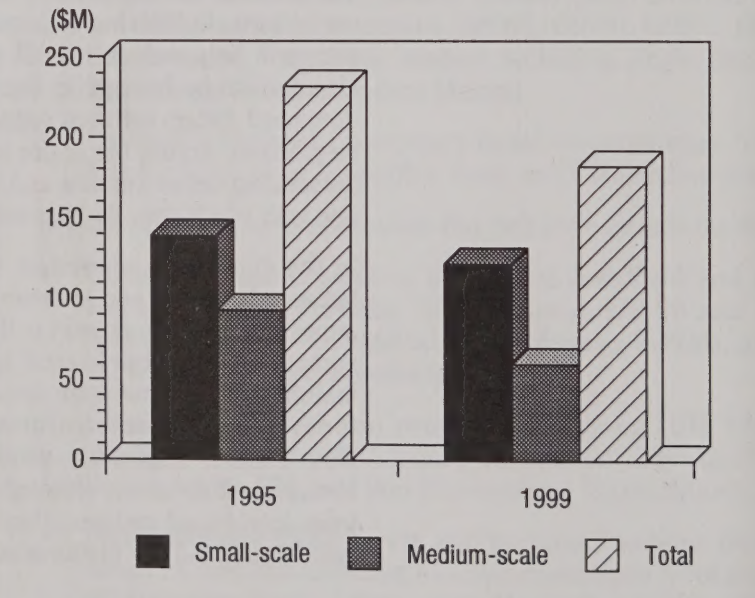
**U.S. AS/400 System Revenue, 1995 and 1999**




Source: International Data Corporation, 1995

**Figure 5**

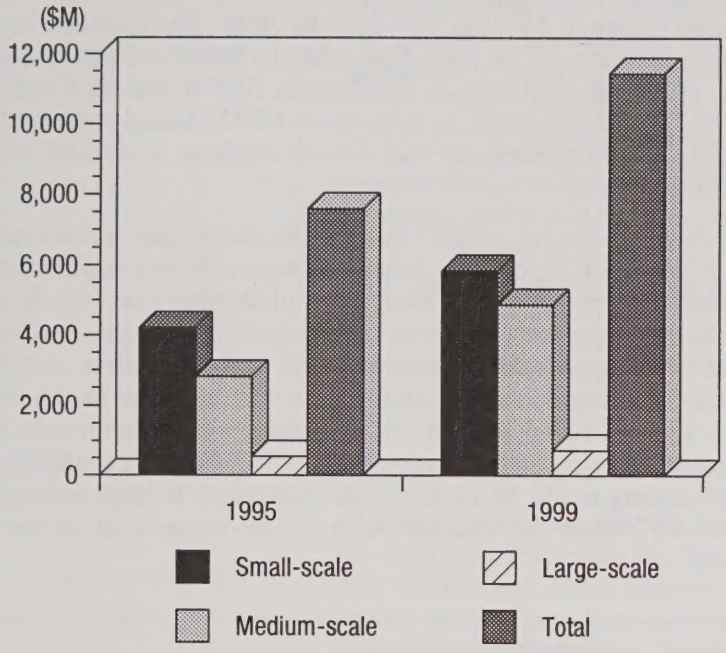
**U.S. Open VMS System Revenue, 1995 and 1999**




Source: International Data Corporation, 1995

**Figure 6**

**U.S. Unix System Revenue, 1995 and 1999 ($000)**

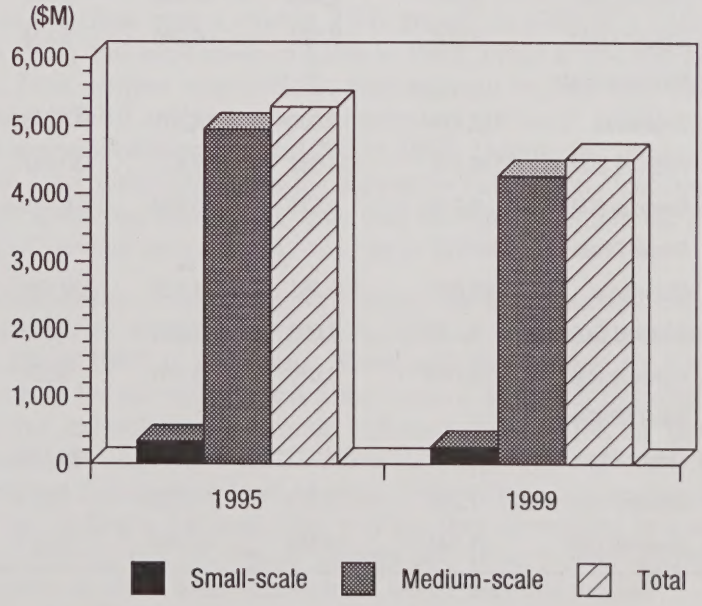



Source: International Data Corporation, 1995

In light of these issues, it is clear that many multiuser system firms are facing several serious threats. The good news is that after several years of declining revenues, the multiuser systems market is starting to rebound. In 1994 U.S. multiuser system revenues were nearly $19.7 billion, an 8.1% drop from 1993. Through the end of the decade, however, revenues should increase slightly, hitting $23.3 billion in 1999 (see Table 3). Make no mistake that, compared to other IT market segments, multiuser systems are far from a high-growth market, brimming with untapped opportunity for everyone. However, if multiuser vendors can successfully lower costs to remain competitive while continuing to meet their existing customers' needs, significant profitability should be at hand.

**Figure 7**

**U.S. S/390 System Revenue, 1995 and 1999**




S/390 medium-scale includes 370 medium-scale

Source: International Data Corporation, 1995

### *Large-Scale Systems*

After several years of steady decline, revenues in the large-scale tems market stabilized in 1994. Large-scale unit shipments increase through the end of the century, rising from 848 units in United States in 1995 to 959 units in 1999. The increase in s ments, however, will be more than offset by falling average system ues, which will drop from $7.1 million in 1995 to just $5.7 millio 1999, as vendors move to lower-cost CMOS-based systems. A result, U.S. large-scale revenue should continue to decline thro 1999.

Although downsizing is still a factor in the large-scale systems mar most wholesale downsizing (where an organization's mainframes completely replaced with alternative platforms) has already tak place. In fact, some customers are recognizing the validity of cert mainframe applications. Online transaction processing, and ba applications in particular, continue to be maintained on mainframes they are well suited to high-volume transaction environments. Gi this capability, customers are hesitant to migrate since rewriting th applications would be prohibitively expensive. If large-scale syst costs are brought in line, customers will be happy to continue us them.

**Table 3**

**U.S. Multiuser System Market, 1993–1999**

| | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 |
|---|---|---|---|---|---|---|---|
| **Large-Scale** | | | | | | | |
| Shipments | 757 | 834 | 848 | 876 | 910 | 934 | 959 |
| Installed base | 9,867 | 9,655 | 10,406 | 10,706 | 11,090 | 11,528 | 11,955 |
| Revenue ($M) | 6,504 | 6,094 | 6,005 | 5,874 | 5,742 | 5,587 | 5,450 |
| **Medium-Scale** | | | | | | | |
| Shipments | 12,771 | 13,966 | 14,601 | 15,548 | 16,450 | 17,100 | 17,804 |
| Installed base | 136,355 | 135,087 | 129,421 | 130,147 | 133,424 | 139,067 | 146,175 |
| Revenue ($M) | 6,275 | 5,575 | 5,694 | 6,038 | 6,466 | 6,820 | 7,225 |
| **Small-Scale** | | | | | | | |
| Shipments | 130,027 | 138,751 | 171,529 | 210,280 | 260,735 | 311,473 | 373,663 |
| Installed base (000) | 1,123 | 1,068 | 1,153 | 1,273 | 1,440 | 1,650 | 1,911 |
| Revenue ($M) | 8,768 | 8,017 | 8,751 | 9,302 | 9,777 | 10,173 | 10,615 |
| **Total Multiuser** | | | | | | | |
| Shipments | 143,555 | 153,551 | 186,978 | 226,704 | 278,095 | 329,507 | 392,426 |
| Installed base (000) | 1,270 | 1,213 | 1,292 | 1,413 | 1,584 | 1,800 | 2,069 |
| Revenue ($M) | 21,547 | 19,686 | 20,450 | 21,214 | 21,985 | 22,580 | 23,290 |

Source: International Data Corporation, 1995

Thus, migration to the CMOS architecture is one of the key challenges large-scale system vendors face because it is so closely tied to the expense of large-scale systems. Managing this major transition will be tricky because vendors will have to carefully determine pricing (and control revenues and expenses to retain profitability under lower pricing schemes); nevertheless, CMOS systems should bring large-scale system cost structures in line with midrange offerings. Once costs are similar between large-scale and midrange systems, customers will have little reason to migrate considering the expense of doing so.

Large-scale system vendors will also be migrating to massively parallel processor (MPP) architectures over the next few years. This transition will also prove critical. MPP capabilities will help differentiate large-scale systems from increasingly powerful midrange alternatives.

Other issues large-scale vendors will have to cope with include depressed storage revenues — the result of ongoing third-party competition — and software costs that remain relatively prohibitive.

### *Medium- and Small-Scale Systems*

The medium and small-scale systems markets, known collectively as the midrange, have been the first of the multiuser system segments to face intense and direct competition from Intel-based offerings. As a result, vendors have been scrambling to reduce costs and lower pricing, particularly in the small-scale space where firms increasingly face traditional LAN server players like Compaq. As with the rest of the multiuser market, software support will also play a critical role as vendors implement multiple processor architectures to boost performance across the midrange.

The outlook for both the medium and small-scale segments through 1999 is for moderate growth. Fueled by demand for larger Unix SMP (symmetric multiprocessing) systems, medium-scale U.S. revenue growth will vacillate from a modest 2.1% growth in 1995 to a high of 7.1% in 1997, and back down to 5.9% in 1999. From a platform perspective, Unix systems represent the only segment (vs. AS/400, Open VMS, and S/390) with increasing revenues (in both small- and medium-scale installations) from 1995 to 1999. Despite the increased stature of Unix platforms in the medium-scale range, non-Unix product families offering specialized value and baseline Unix affinity, like Tandem's Guardian systems, will continue to thrive.

Small-scale system revenue growth, driven by the development of application-server markets, will peak in 1995 at 9.2% and gradually fall to 4.3% in 1999. In some ways, Novell with its NetWare 4.x is the heir apparent for alternative application servers. How well the vendor diffuses this technology will strongly influence the outlook for traditional midrange and Windows NT server offerings. All multiuser system firms are facing some level of price competition, but small-scale vendors are feeling it the most. Not only are they scrambling to lower costs and pricing, but small-scale vendors also need to shift distribution channels to reach today's customers where they like to shop.

## Traditional Workstations

The traditional workstation market is holding its own, despite aggres sive competition from Intel-based offerings, primarily at the low end In 1994, fueled by pent-up demand, traditional workstation uni shipments grew by 19.0% to 618,550, while revenues expanded 5.0% to nearly $10 billion. Thus, although the average system price fell by 12.0% to $15,800, this decline was more than offset by increased volume.

In the future, however, the popularity of Intel-based PCs running Win dows NT will cause growth to erode in the traditional workstation market. Although Windows NT-based systems are unlikely to steal much business in technical applications (where workstations currently dominate) by 1999, they will prevent workstations from expanding sig nificantly into business applications. As a result, unit and revenue growth will slow for traditional workstations through 1999 when just over 1 million units will ship and revenue will hit $14.5 billion (see Table 4).

**Table 4**

**Worldwide Traditional Workstation Market, Shipments and Revenue, 1994–1999**

| | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | CAGR (%) 1995–1999 |
|---|---|---|---|---|---|---|---|
| Shipments (000) | 619 | 705 | 783 | 860 | 945 | 1,036 | 10.9 |
| Growth (%) | 19.0 | 13.9 | 11.2 | 9.8 | 9.8 | 9.7 | |
| Revenue ($M) | 9,793 | 11,433 | 12,116 | 12,872 | 13,620 | 14,537 | 8.2 |
| Growth (%) | 5.0 | 16.8 | 6.0 | 6.2 | 5.8 | 6.7 | |
| ASP ($) | 15,831 | 16,227 | 15,470 | 14,966 | 14,420 | 14,032 | -2.4 |
| Growth (%) | | 2.5 | -4.7 | -3.3 | -3.6 | -2.7 | |

Source: International Data Corporation, 1995

High-performance graphics and throughput will continue to be key differentiators in the traditional workstation segment. In this regard workstation vendors must keep their systems a step or two ahead of NT offerings in order to maintain premium pricing. Relations with software developers are also important. Vendors must ensure continued application support and see to it that hardware performance benefits are realized.

By 1999, Sun and HP will be the leaders in the traditional workstation market, but the third position will be a hotly contested spot. Based on Silicon Graphics' current growth rate and increasing popularity in growth niches, the company has the potential to overtake both IBM and Digital in unit shipments by 1999.

*(Note: Most of the* Special Edition *report highlights U.S. data. However, limited new U.S. data for traditional workstations was available at printing. As opposed to using older and soon-to-be-outdated U.S. information, this section focuses on IDC's just-released worldwide data.)*

## Definitions

Multiuser platforms and installations are defined as follows:

- **Multiuser systems** comprise all large-, medium-, and small-scale systems and all computer systems except personal computers and workstations.
- **Midrange systems** comprise all medium- and small-scale systems.
- **Large-scale systems** are either large general-purpose or high-speed scientific computers with average system values generally in excess of $1 million. Representative systems include IBM's 308X, 3090, and water-cooled 390 series and their competitors, as well as so-called supercomputers. Currently shipping models in this category typically support more than 128 users in a commercial environment.
- **Medium-scale systems,** which include traditional supermini-class computers and some systems classified by their vendors as small mainframes, generally have average system prices ranging from $100,000 to $1 million. Currently shipping models in this category typically support 33 to 128 users in a commercial environment. Representative systems include IBM's 43XX, 9370, System/38, larger AS/400s, and air-cooled 390s as well as the upper ranges of Digital's VAX series (including all 8000s and 6000s), and their competitors. Medium-scale systems are typically packaged in large file-cabinet-sized or rack-mountable configurations.
- **Small-scale systems** typically range from $10,000 to $100,000. Currently shipping models usually support 2 to 32 users in a commercial environment. Small-scale systems are also commonly used in automation, control, and communications processing environments, and increasingly as network servers.

  Representative systems include lower-range VAX systems from Digital (including all nonworkstation MicroVAXs); from IBM, the Series/1, System/36, smaller AS/400 models, and server/multiuser configurations of the RISC System/6000; and low-end multiprocessing multiuser microprocessor-based systems from Altos, NCR, and others.

  High-end commodity-chip models with multiprocessing capabilities specifically designed to function as multiuser systems or servers are counted as small-scale systems, even if manufactured by vendors typically associated with the PC or workstation market (for example, the Compaq Systempro or Sun Sparcserver). Small-scale systems are typically packaged in desktop boxes or deskside towers.

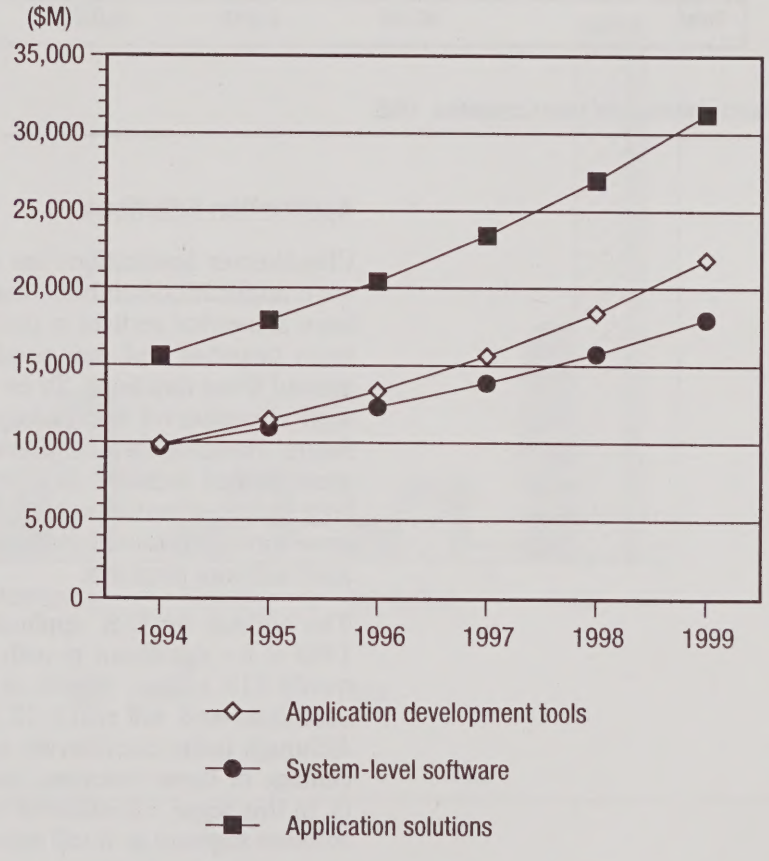
- **Traditional workstations** are defined by processor, operating s tem, and typical price band. IDC has defined this segment of t market to include the typical workstation-class processors such Sparc, MIPS, PA-RISC, PowerPC, and Alpha. The operating s tem includes advanced environments, primarily Unix. A typi price for this type of system falls in the $12–15,000 range. T majority of these systems are sold into technical applications.

# Software

U.S. total software revenues will grow steadily through 1999. From a base of $35.2 billion in 1994, the U.S. software market will achieve year-over-year revenue growth in the low-to-mid teens, reaching $71.1 billion in 1999. Of the three primary software markets — application solutions, system-level software, and application development tools — application solutions is the largest in terms of U.S. revenues and will remain so through 1999. Application development tools, however, is the fastest-growing segment, having U.S. revenue growth in the mid-to-high teens through 1999 (see Figure 8 and Table 5).

**Figure 8**

**U.S. Software Market Revenue, by Primary Market, 1994–1998**




Source: International Data Corporation, 1995

If a universal top-level trend can be found in the incredibly diverse segments that make up the software market, it is probably the importance of open solutions and systems management capabilities. More than ever, customers are demanding the ability to share and manage assets across their existing enterprise, whether it is spreadsheet data on a notebook PC or transaction information on a mainframe. And

although it is unlikely that IS will be managing Windows PCs from their database server anytime soon, IS is definitely trying to establish management tools and procedures that are as all-encompassing as possible. As networks expand, companies reengineer themselves, and collaborative computing begins to take hold, software solutions – whether they are applications, tools, utilities, or operating systems – must fit into the enterprise environment.

**Table 5**

**U.S. Software Market Revenue by Segment, 1994–1998 ($M)**

| | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 |
|---|---|---|---|---|---|---|
| Application solutions | 15,604 | 17,888 | 20,418 | 23,429 | 26,994 | 31,234 |
| Application development tools | 9,865 | 11,478 | 13,359 | 15,597 | 18,362 | 21,859 |
| System-level software | 9,719 | 10,952 | 12,309 | 13,891 | 15,754 | 17,980 |
| Total | 35,187 | 40,318 | 46,087 | 52,916 | 61,111 | 71,073 |

Source: International Data Corporation, 1995

## Application Solutions

Client/server applications are driving much of the growth in the software application-solution market. So far, client/server business has been somewhat vertical in that specific functions like accounting have been targeted and new products and businesses have sprung up around these functions. To be fair, new functions are being automated with client/server technology today, and more will emerge in the future. However, for client/server to fulfill its promise, these functions must be tied together to enable cross-department automation. Such larger-scale client/server applications are where the real money is since most individual functions are not a sizable opportunity for packaged software products.

The outlook for U.S. application-solution software revenue through 1999 is for significant growth. After expanding by 14.6% in 1995 to nearly $18 billion, growth in application-solution U.S. revenue will accelerate and will reach 15.7% by 1999 and just over $31 billion. Although today client/server applications account for just a small percentage of these revenues, such applications are where most growth is. In this sense, client/server represents the rebirth of the application-solution segment as it will rejuvenate expansion.

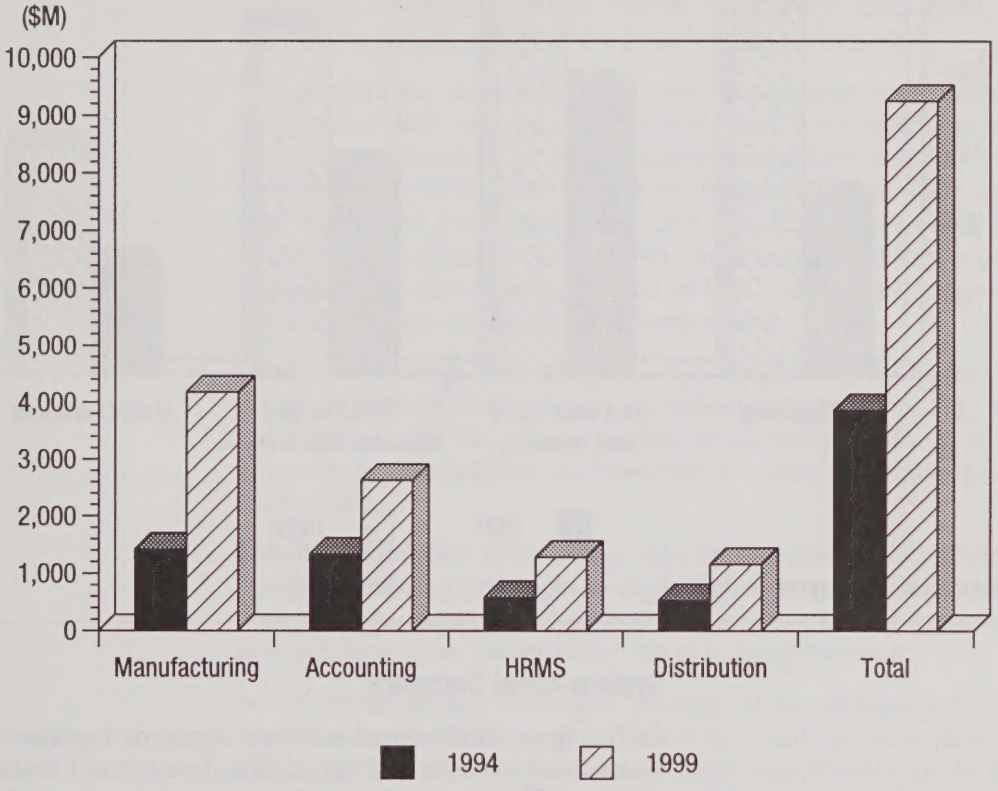
Initial applications that have generated client/server-application demand include workgroup computing, workflow automation, and supply-chain automation. However, as both vendors and users have migrated legacy production code to target these applications, they have discovered new associated applications. For example, client/server accounting vendors offering basic general ledger, accounts payable, and/or fixed-asset applications are increasingly competing on value-added functions such as budget-process automation, reporting, and workflow.

As vendors and customers move to provide large-scale cross-department applications, they are evaluating departments that traditionally have been underautomated, like customer service, sales, and marketing. In the near future, these will become important functions to address.

Toward the end of the century, object and intelligent-agent technologies increasingly will become the basis for providing innovative solutions to long-existing business problems. Objects and agents will take client/server to the next level, empowering decision-makers across organizations and facilitating efficient and effective collaboration among people regardless of physical location and time zones (see Figures 9 and 10).

**Figure 9**

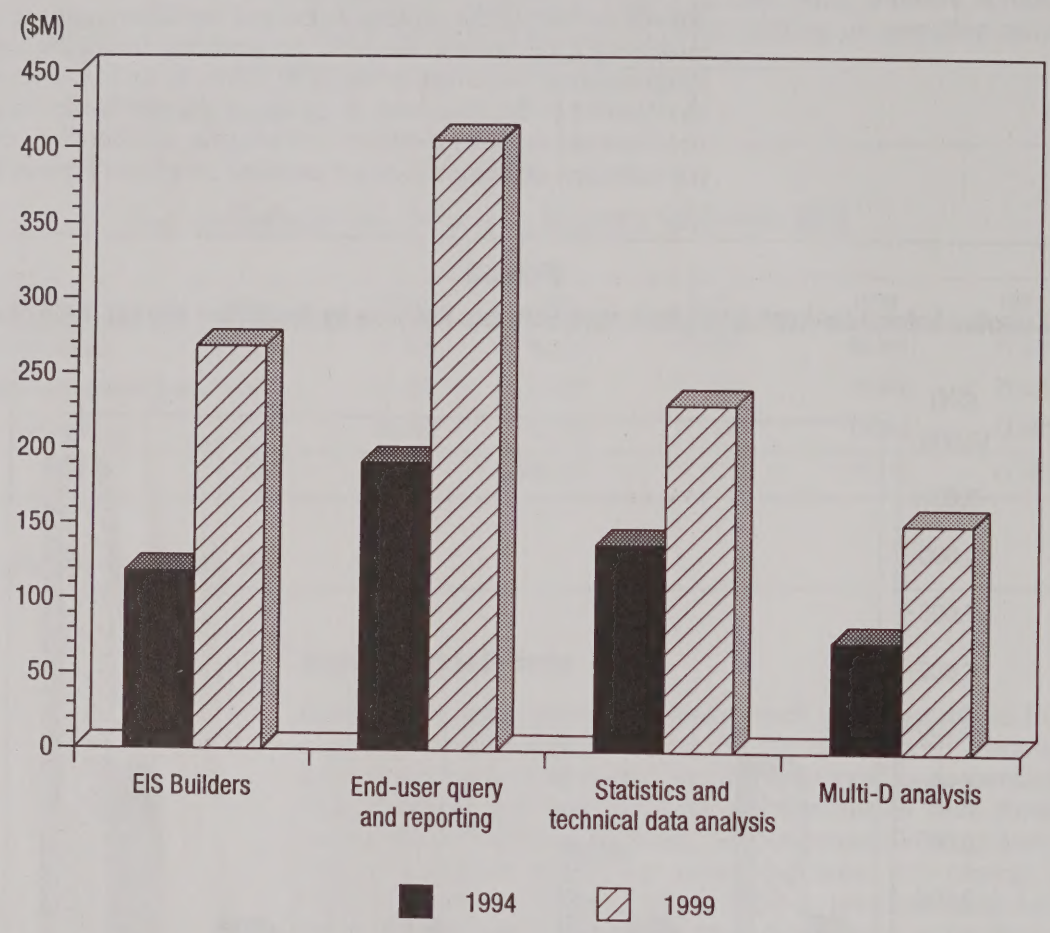
**U.S. Selected Enterprise-Application Packaged Software Revenue by Secondary Market, 1994 and 1999**




urce: International Data Corporation, 1995

**Figure 10**

**U.S. Selected Information-Access-Tool Packaged Software Revenue by Secondary Market, 1994 and 1999**




Source: International Data Corporation, 1995

## System-Level Software

Of the three fundamental software segments (application solutions, system-level software, and application-development tools), system-level software is the smallest and will grow the most slowly. From U.S. revenues of $9.7 billion in 1994, the system-level software market will grow by 12.7% in 1995 to nearly $11 billion. After a slight decline in growth in 1996, 12.4% to $12.3 billion, the system-level segment will steadily expand to almost $18 billion by 1999.

The key to success for traditional system software vendors is to smoothly transition their mainframe product lines to less expensive and more open solutions. Next-generation products will be running in and managing more diverse environments; in order to fund their development, vendors will need to watch revenues carefully.

Open-system and PC-LAN-oriented firms face different challenges. Though they are well known at the desktop and in small LAN installations, they frequently have little mindshare or credibility in enterprise IS organizations. Their success will depend on their ability to convince IS that they understand the rigorous requirements for business-critical systems and then to deliver products that fill these needs.

## Application-Development Tools

Of the three fundamental software segments, the market for application-development tools will enjoy the most rapid growth through 1999. From a base of nearly $9.9 billion in U.S. revenues in 1994, the application-development tool segment will expand by 16.4% in 1995 to $11.5 billion. Growth will continue to accelerate through 1999 at 19.0%, raising $21.9 billion in revenue. Continued penetration of relational database management systems and their associated database tools, as well as the availability of various tools that address client/server needs (3GL, 4GL, and CASE), will drive most of the growth in the tools market.

Tool vendors are delineating themselves by choosing one of three tactics. Some CASE vendors, like Intersolv and Texas Instruments, are reinventing themselves as methodology-independent component tool suppliers. In general, these firms have struggled to ramp their component tool efforts before monolithic and consulting-heavy CASE-based opportunities at large shops dried up. For a component-tool approach to work, the toolset must be defined so that it is scalable across application challenges and levels of user experience.

Other CASE and 4GL vendors, like Cognos and Oracle, have released products that focus on second-generation technology, which will enable larger and more complex applications. In doing so, they have conceded mindshare to Powersoft for initial information-access applications.

Finally, vendors like IBM, Oracle, and Sybase have added downward-scalable databases and tools to exploit workgroup and departmental opportunities. Because this opportunity is very widely dispersed, success will depend on cost-effective use of indirect channels.

In the DBMS market, demand is peaking for the replacement of non-relational engines with engines based on relational data structures. While virgin niches remain, much larger opportunity exists in the workgroup server and desktop engine markets.

## Definitions

The various software segments are defined as follows:

- **Packaged software** is defined as commercially available programs for sale or lease from systems vendors and independent software vendors. IDC includes the packaged software fees plus related nonconsulting revenues, such as fees for maintenance and/or support. IDC does not include consulting or systems integration revenues or specially designed application software solutions added

by turnkey systems houses (including VARs) to systems acquired from a hardware manufacturer or other third-party vendor.

- **Primary software markets** refer to the aggregation markets for application solutions, application-development tools, and system-level software. The three primary markets together compose the worldwide software market.
- **Application-solution software** includes consumer, commercial, and technical programs designed to provide packaged solutions for specific problems inherent in the home or in an industry or business function.
- **System-level software** includes three primary categories of packaged software: systems management, operating systems, and utilities/middleware.
- **Application-development tools** is the aggregate of two markets —
  - **Information-access tools** are end-user tools for ad hoc data access, analysis, and reporting. Products in this category are most commonly used by novice or power users rather than by professional programmers. Examples include spreadsheets, executive information systems, and statistics.
  - **Programmer development tools** support the professional developer in the design, development, and implementation of a variety of software systems and solutions. The market for programmer development tools includes markets for both object-oriented and conventional (nonobject) tools. Examples include database engines, 4GLs, report writers, CASE, 3GLs, and AI/expert systems builders.

(Appendix Table A1 details IDC's packaged software functional taxonomy.)

## PC Operating Systems

Volumes in the PC operating systems (OSs) market are strongly tied to PC shipments. In fact, as discussed in the "Definitions" section, IDC's PC and Consumer Software program this year began to focus on tracking PCs by operating system, rather than the total number of OS licenses shipped. As a result, most of the analysis in this section will be focused on the percentage of PC shipments that various OSs capture as opposed to total license shipments (see Tables 6 and 7).

In case there is any doubt concerning Microsoft's dominance of the PC OS market, consider the following:

- From an impressive base of accounting for 71.2% of worldwide PC shipments in 1995, by 1999 Microsoft's desktop OSs (Windows/DOS, Windows 95, and Windows NT Workstation) will garner 75.7% of shipments.
- Thanks to its aggressive Warp rollout, IBM's OS/2 jumped from a 4.2% share of worldwide PC shipments in 1994 to 6.7% in 1995. In 1997, OS/2 will peak at 7.4% of global PC units, after which it will hold at 7.3% for 1998 and 1999.

- Apple's Mac OS actually peaked in 1993 when it earned 9.4% of the worldwide PC market. In 1995, the Mac OS will recover from its 1994 low of 8.1% of global PC units to account for 8.2%, after which its share will steadily grow to 8.9% in 1999.

**Table 6**

**Worldwide Shipments and Market Share of New PCs by Operating System, 1993–1999 (000)**

| | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | CAGR (%) 1994–99 |
|---|---|---|---|---|---|---|---|---|
| **Shipments** | | | | | | | | |
| DOS alone | 9,310 | 7,810 | 5,710 | 5,380 | 4,580 | 3,910 | 3,010 | -17.4 |
| Windows/DOS | 22,570 | 32,620 | 24,660 | 5,780 | 3,010 | 1,210 | – | -100 |
| Windows 95 | – | – | 15,700 | 41,600 | 50,860 | 59,210 | 68,490 | NA |
| Windows NT Workstation | 70 | 140 | 460 | 750 | 1,820 | 3,110 | 3,850 | 94.0 |
| OS/2 | 1,440 | 2,060 | 3,850 | 4,750 | 5,580 | 6,250 | 6,990 | 27.7 |
| Other (Unix and multiuser) | 1,320 | 1,580 | 1,900 | 2,280 | 2,690 | 3,210 | 3,500 | 17.2 |
| Subtotal Intel (incl. piracy) | 34,710 | 44,210 | 52,280 | 60,540 | 68,540 | 76,900 | 85,840 | 14.2 |
| Mac OS | 3,660 | 3,940 | 4,730 | 5,560 | 6,610 | 7,480 | 8,530 | 16.7 |
| Other | 650 | 350 | 350 | 300 | 650 | 900 | 1,150 | 26.9 |
| Total PC shipments | 39,020 | 48,500 | 57,360 | 66,400 | 75,800 | 85,280 | 95,520 | 14.5 |
| **Share (%)** | | | | | | | | |
| DOS alone | 23.9 | 16.1 | 10.0 | 8.1 | 6.0 | 4.6 | 3.2 | |
| Windows/DOS | 57.8 | 67.3 | 43.0 | 8.7 | 4.0 | 1.4 | 0.0 | |
| Windows 95 | 0.0 | 0.0 | 27.4 | 62.7 | 67.1 | 69.4 | 71.7 | |
| Windows NT Workstation | 0.2 | 0.3 | 0.8 | 1.1 | 2.4 | 3.6 | 4.0 | |
| OS/2 | 3.7 | 4.2 | 6.7 | 7.2 | 7.4 | 7.3 | 7.3 | |
| Other (Unix and multiuser) | 3.4 | 3.3 | 3.3 | 3.4 | 3.5 | 3.8 | 3.7 | |
| Subtotal Intel (incl. piracy) | 89.0 | 91.2 | 91.1 | 91.2 | 90.4 | 90.2 | 89.9 | |
| Mac OS | 9.4 | 8.1 | 8.2 | 8.4 | 8.7 | 8.8 | 8.9 | |
| Other | 1.7 | 0.7 | 0.6 | 0.5 | 0.9 | 1.1 | 1.2 | |
| **Total PC shipments** | 39,020 | 48,500 | 57,360 | 66,400 | 75,800 | 85,280 | 95,520 | |

Source: International Data Corporation, 1995

**Table 7**

**U.S. Shipments and Market Share of New Intel PCs by Operating System, 1993–1999**

| | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 |
|---|---|---|---|---|---|---|---|
| **Share of New Intel PC Shipments (%)** | | | | | | | |
| DOS alone | 27.0 | 16.9 | 8.6 | 6.0 | 5.0 | 4.0 | 3.0 |
| Windows/DOS | 68.7 | 78.0 | 48.0 | 9.8 | 4.7 | 0.0 | 0.0 |
| Windows 95 | 0.0 | 0.0 | 35.0 | 75.0 | 79.5 | 83.8 | 84.5 |
| Windows NT Workstation | 0.3 | 0.6 | 1.4 | 1.7 | 3.3 | 4.7 | 5.0 |
| OS/2 | 4.0 | 4.5 | 7.0 | 7.5 | 7.5 | 7.5 | 7.5 |
| Total (incl. piracy) | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Win3.x and Windows 95 | 68.7 | 78.0 | 83.0 | 84.8 | 84.2 | 83.8 | 84.5 |
| Win16 and 32 | 69.0 | 78.6 | 84.4 | 86.5 | 87.5 | 88.5 | 89.5 |
| **New Intel PC Shipments (000)** | | | | | | | |
| DOS alone | 3,308 | 2,576 | 1,570 | 1,229 | 1,156 | 1,019 | 838 |
| Windows/DOS | 8,418 | 11,887 | 8,765 | 2,007 | 1,086 | – | – |
| Windows 95 | – | – | 6,391 | 15,361 | 18,373 | 21,347 | 23,600 |
| Windows NT Workstation | 42 | 90 | 263 | 357 | 751 | 1,185 | 1,396 |
| OS/2 | 490 | 686 | 1,278 | 1,536 | 1,733 | 1,911 | 2,095 |
| Total (incl. piracy) | 12,259 | 15,238 | 18,268 | 20,490 | 23,100 | 25,461 | 27,929 |

Unix and servers not included in data.
Source: International Data Corporation, 1995

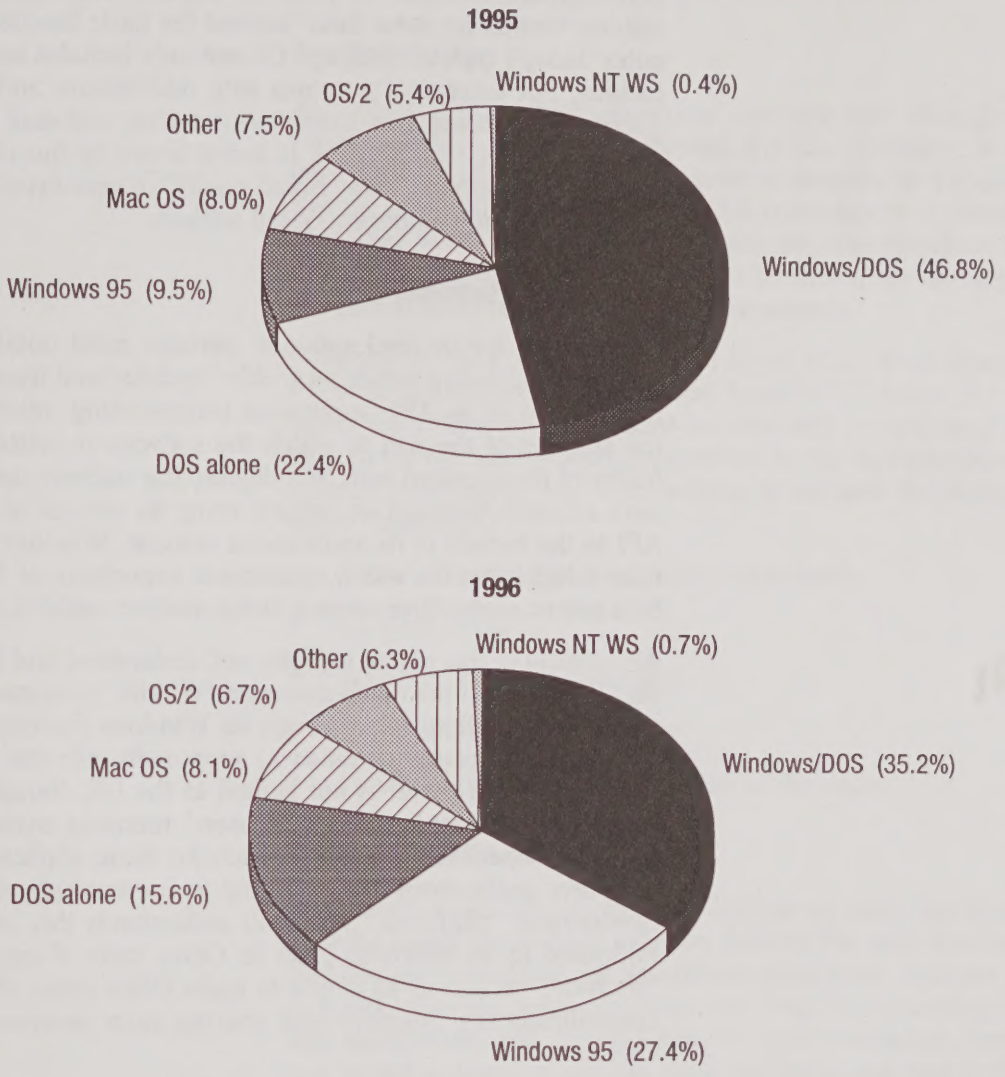
### *Windows 95*

Microsoft will ship nearly 20 million Windows 95 licenses in 1995 — 15.7 million with new PCs and 4.2 million as upgrades (see Figure 11). Cast in this light, it is hard to view the Windows 95 rollout as anything but a success. However, to fulfill the product's true promise and keep its revenues growing, Microsoft must not only gain new customers but get existing users to upgrade, particularly since Windows 95 is the successor to Windows 3.x and there will be no DOS 7. In this regard, the vendor faces moderate challenges in corporate and home upgrades, not to mention in application upgrades.

Based on survey results, we expect major corporate upgrades to wait until Q1/Q2 of 1996 and that much of this upgrade will be tied to the purchase of new systems. Corporate application upgrades will be more difficult, even though many of Windows 95's perceived benefits (like improved multitasking) virtually require 32-bit applications. Ironically, our Cost- and Value-to-Use analysis indicates that Office 4.x sites can pay back the cost of a combined Windows 95/Office 95 upgrade in less than a year and benefit from more subjectively measured productivity improvements, which could justify a five-month payback.

**Figure 11**

**Worldwide PC Market by Operating System, Installed Base, 1995 and 1996 (%)**




Source: International Data Corporation, 1995

On the home front, while new systems are a cinch, upgrades are complicated by the fact that historically home users don't upgrade anything — not hardware, not applications — certainly not operating systems. The magnitude of Microsoft's marketing and advertising campaign for Windows 95, however, should alleviate at least some of this upgrade hesitancy.

Nonetheless, with 15.7 million new Windows 95 PCs shipping worldwide in 1995, the new OS will earn an impressive 27.4% of the total new PC market. The reality that Q4 alone will account for a significant portion of the total units shipping this year partially explains Windows 95's significant share this year, but it is admirable nonetheless. As we look toward the end of the century, Windows 95's share of worldwide PC shipments will steadily grow, from 62.7% in 1996 to 71.7% in 1999.

### *PC OS Trends*

The role of the desktop operating system is being redefined by three related concepts: application platforms, user interfaces, and component software. Contrary to what the popular press claims, operating systems now do far more than "control the basic functions" of a computer. Today's typical "desktop" OS not only includes miniature applications, but increasingly comes with middleware and networking, distributed computing and directory services, and mail services. The evolution of the OS, however, is being driven by the rise of application(s) as "platform(s)," the "brand equity" of user interfaces, and the migration toward component-based software.

### *Application "Platforms"*

Suppliers of system-level software, perhaps most notably Microsoft, have realized that a highly profitable "architectural franchise" can be built on top of an API (application programming interface). That is, the supplier of the API to which the software is written is the controller of the standard and, to a degree, the software developer. Many have accused Microsoft of unfairly using its control of the Windows API to the benefit of its applications division. Whether or not this is true, it highlights the widely understood importance of APIs: they can be a potent competitive weapon in the modern world of open systems.

API control of this nature is pretty well understood and largely defines the "Win" part of the much-discussed "Win-tel" joint-monopoly theory (under which Microsoft, through its Windows franchise, and Intel, through its processor dominance, supposedly rule the modern computing era). API power is not limited to the OS, though. As was the case when DOS applications were users' operating environments (and savvy developers sold add-on products for those applications), today's Windows applications are emerging as increasingly viable software development "platforms." Microsoft understands this concept well as evidenced by its efforts to push its Office suite of applications as a "platform," as well as its efforts to make Office more platform-like by streamlining the interface and sharing such components as spell checkers.

Another notable example of an API becoming a platform is Netscape Communications' Navigator Web browser. By achieving dominance in the browser market (through giving away a highly desirable product) Netscape now defines the browser standard. Developers looking to create software that works with Web browsers target Netscape's browser first. "Helper" applications (which feature such capabilities as playing sound and/or video and viewing graphics) that have been expressly designed to work with Netscape's Navigator are already available from third-party developers. In this sense, Navigator has become the development platform for Internet applications.

Thus, in the same way that Microsoft has achieved dominance in the desktop applications market through controlling the Windows API, Netscape may achieve dominance in the Internet applications market

through controlling the Navigator API. Even now, Netscape is leveraging the Navigator API to sell Web server software. As new capabilities are added to the Navigator browser, like the ability to display tables, Netscape's server software is the first to support them.

### *User Interfaces*

As control of the software developer can be gained through the API, control of the user is gained through the user interface. In the DOS days, the operating system was in a sense invisible to the end user; it was the applications (like Lotus's 1-2-3 spreadsheet or WordPerfect's namesake word processor) that defined the user interface. But with the advent of the Macintosh, and then Windows, the developer of the OS gained more control of the "user experience."

Windows 95 hype to the contrary, it is not clear which direction user interface leadership will go. Typical business PC users, for example, spend more time in applications — especially in integrated suites — than in the OS shell. Future competition in the user interface area will emerge over which tools users employ to navigate the following and other "landscapes":

- Suites of applications and, later, components
- LAN resources
- WAN and corporate resources
- Home and consumer services
- Mobile systems interacting with all of the above

### *Component Software*

Application suites (like Microsoft Office) are an early step toward what is being called component software. Driving the need for component software are monolithic, multifunction applications that are unwieldy to build, maintain, and sometimes even use. By separating functions into components and defining rules for their interaction, applications can be better tuned to specific users and tasks, and new technologies can be added more easily. A simple example of component software design is using a single spell-checker for an entire application suite (word processor, spreadsheet, etc.).

It is debatable what level of functionality is required in the OS to enable component software. For example, the interface for navigating among components, and tools which allow power users to glue components together to customize application functionality (scripting languages, visual interfaces), might reside in what we think of today as an OS. Or, component tools could sit atop some sort of component framework. At the very least, some level of basic infrastructure within the desktop operating system is required. The nature of this foundation, and the component standard(s) it supports, will be another point of leverage for software firms, much like more standard APIs.

*(Note: Most of the* Special Edition *report highlights U.S. data. However, limited new U.S. data for PC operating systems was available at printing. As opposed to using older and soon-to-be-outdated U.S. information, this section focuses on IDC's just-released worldwide data. According to IDC's software market taxonomy, PC operating systems are part of the system-level software primary market.)*

## Definitions

This year, IDC started covering PC operating systems by tracking PCs by operating system rather than the total number of OS licenses shipped. Forecasts for shipments of network OSs, multiuser Unix variants that run on PCs, single-user Unix variants that run on PCs, and application-server OSs that run on PCs are all stripped out of the overall PC hardware forecast. The remaining PC shipments are candidates for PC OSs. Forecast penetration rates are then calculated as percentages for these PC OSs. Please note the following:

- The PC hardware forecast from which this report is derived does not include what IDC classifies as traditional workstations (that is, largely RISC-based systems designed for networked, usually technical, applications).
- Forecasts of Mac OSs are based on Macintosh hardware forecasts, including systems from both Apple and clones.
- Dedicated game machines, such as those made by Nintendo or Sega, are not analyzed. Neither are personal digital assistants (PDAs), pocket organizers, or intelligent communicators.

# Networking

In the year in which the mere word "Internet" moved out from the exclusive domain of the IT professional and into the daily lexicon of the business public (if not the general consumer world), it is not surprising that sales of hardware and software products aimed at moving and managing information soared in 1994. The outlook for almost all segments of products in these categories remains very strong for the next five years. From an impressive base of more than $9.1 billion in 1993, the LAN segment will expand to a whopping $15.4 billion market in 1998, a compound annual growth rate of 11.0%. Not only is this growth driven by the ongoing penetration of LANs into large businesses — as they continue to grow, extend, and upgrade their networks — but also by the implementation of LANs in small- and medium-sized business (and even in some homes/home offices).

Of the segments that make up the LAN market, backbone switches and servers are the fastest growing in terms of revenues with 1995–1998 CAGRs of 33% and 15%, respectively. The server market's continued robust growth is particularly impressive since it is also the largest LAN market segment. Average server prices of $10,000 and up suggest its status shouldn't be too surprising — no wonder PC vendors are stumbling over one another to increase their business in this segment (see Figure 12 and Appendix Table A2 for U.S. LAN revenues by segment; Figure 13 compares LAN hardware vs. LAN software revenue in 1993 and 1998).

After peaking in 1996, both the PC network interface card and hub segments will decline, victims of market saturation. Both of these segments are also shifting to higher-speed technology, however, so a short-term window of opportunity may open for new or existing players to gain share.

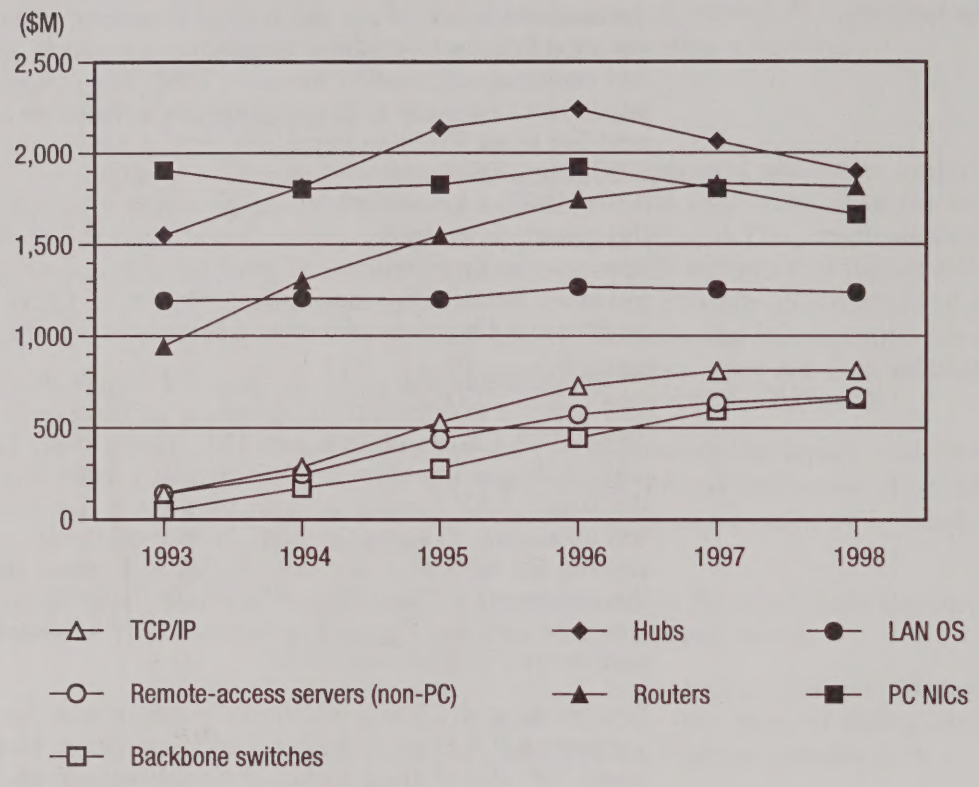
## PC Network Interface Cards (NICs)

The U.S. PC NIC market's salad days are nearly over. Not only are prices falling, but the market is approaching saturation. From U.S. revenues of $1.8 billion this year, the PC NIC market will peak at $1.9 billion in 1996, after which revenues will steadily decline (see Table 8). Given this outlook, some NIC vendors are diversifying into higher-growth markets. 3COM, for example, is aggressively pursuing opportunities in LAN backbone equipment like hubs, routers, and switches.

From a NIC technology standpoint, ethernet dominates today, and it will continue to account for the majority of both unit shipments and revenues through 1999. Meanwhile, token ring unit shipments will be essentially flat through 1999, although the value of these shipments will steadily decline as prices fall. Finally, after rivaling token ring from a unit-shipment perspective in 1997, high-speed NIC shipments (like 100Base-T, 100VG AnyLAN, and ATM) will take off, accounting for roughly half as many shipments (and roughly half as much revenue) as ethernet in 1999. Growth in high-speed NICs will be driven by heightened bandwidth requirements for business applications including LAN-based multimedia (like online training and education) and advanced Internet use.

**Figure 12**

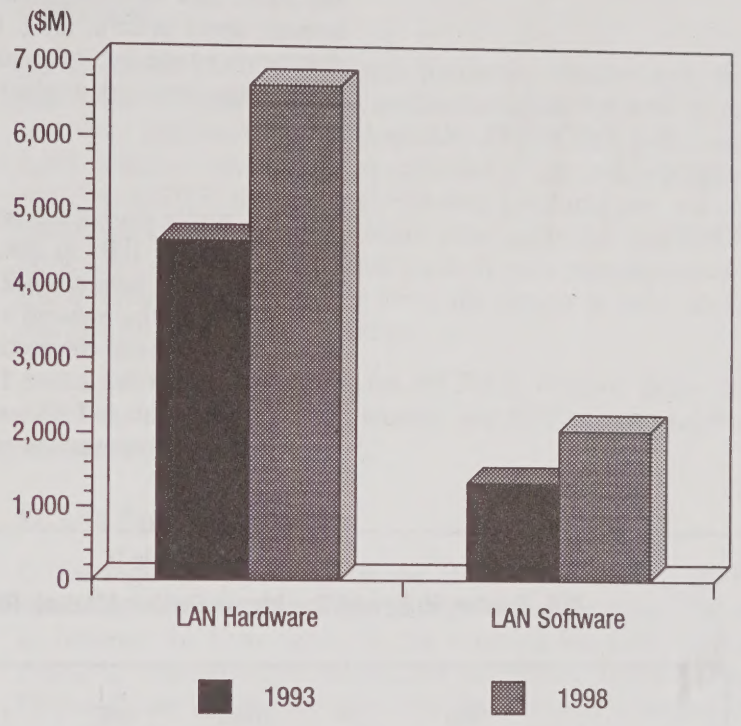
**U.S. LAN Revenues by Segment, 1993–1998**




Source: International Data Corporation, 1995

**Figure 13**

**U.S. LAN Market Hardware vs. Software Revenue, 1993 and 1998**




Source: International Data Corporation, 1995

**Table 8**

**U.S. PC NIC Market, Revenue, 1993–1998 ($M)**

| | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | CAGR (%) 1993–98 | CAGR (%) 1995–98 |
|---|---|---|---|---|---|---|---|---|
| PC NICs | 1,905 | 1,800 | 1,824 | 1,922 | 1,803 | 1,660 | -2.7% | -3.1 |
| Growth (%) | 19 | -6 | 1 | 5 | -6 | -8 | | |

Source: International Data Corporation, 1995

### *Definitions*

IDC forecasts the following network interface card (NIC) products: ethernet, token ring, 100Base-T, 100VG AnyLAN, FDDI/CDDI, desktop ATM, and wireless LANs. The revenue figures are based on the average street price of a PC LAN adapter multiplied by the weighted shipments by vendor (to ensure that low-volume vendors do not skew the average street price value).

## Routers

The U.S. router market will continue to experience steady growth: from 187,365 units in 1994 to 466,128 units in 1999 (1994–1999 CAGR of 20%). Revenues, however, will grow more slowly than units (10% CAGR 1994–1999) as the low-end segment of the router market booms are driven by remote-site connectivity and deeper penetration into midsized and small corporations (see Table 9). The high-end router market will lose unit shipments to LAN switching products in 1997 and 1998, a fate the rest of the router market could share long term.

**Table 9**

**U.S. Router, Hub, and Backbone Switch Market, Revenue, 1993–1998 ($M)**

| | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | CAGR (%) 1993–98 | CAGR (%) 1995–98 |
|---|---|---|---|---|---|---|---|---|
| Routers | 944 | 1,305 | 1,546 | 1,743 | 1,830 | 1,814 | 14 | 5 |
| Growth (%) | 53 | 38 | 18 | 13 | 5 | -1 | | |
| Hubs | 1,550 | 1,813 | 2,135 | 2,239 | 2,064 | 1,897 | 4 | -4 |
| Growth (%) | 54 | 17 | 18 | 5 | -8 | -8 | | |
| Backbone switches | 49 | 172 | 278 | 445 | 592 | 654 | 68 | 33 |
| Growth (%) | 168 | 252 | 61 | 60 | 33 | 10 | | |

Source: International Data Corporation, 1995

## Hubs

The U.S. LAN hub market is about to reach its prime. The good news is that in 1996 more money will be made on hubs in the United States than ever before. The bad news is that following this peak, the market will steadily decline as prices fall (for mainstream ethernet and token ring products), technology matures, and the percentage of PCs connected to LANs reaches saturation. From a technology standpoint, sluggishness in the ethernet and token ring segments will cause the overall market to shrink. High-speed hub sales represent an opportunity, however, since shipments should swell as customers migrate to faster network technology.

Thus, to be successful in the U.S. LAN hub market, vendors must aggressively transition to the high-speed hub offerings (fast ethernet, switched ethernet, ATM, etc.) while also positioning themselves in

other growing LAN backbone opportunities (like switches). Regions outside the United States will remain growth markets for several years, even for basic ethernet and token ring technology.

### *Definitions*

IDC forecasts the following hub products: ethernet and token ring LAN hubs (chassis, stackable, and unmanaged); network management modules; 100BaseT, 100VG AnyLAN, FDDI/CDDI hubs; workgroup LAN switches (switched ethernet/token ring); and workgroup ATM switches (25/155Mbps). The following products are not included: backbone LAN switches (switched ethernet/token ring/FDDI), backbone LAN ATM switches, router cards in hubs, remote-access cards in hubs, terminal-server cards in hubs, file servers in hubs, and network management software applications.

*(Note: LAN hardware includes PC NICs, routers, hubs, backbone switches, and remote-access servers, but NOT servers. LAN software includes LAN OS and TCP/IP.)*

## PC LAN Operating Systems

Of the segments that make up the overall LAN market, the PC LAN operating system segment is arguably the most mature. The segment is, however, far from stable. To the contrary, the LAN OS market is changing so dramatically that today's key players, including Novell and Microsoft, are fighting for their lives. Perhaps the strongest force driving this change is the broader architectural shift to a client/server architecture.

Though the need for basic file and print services is widely understood and implemented in businesses, users are demanding more from their LANs (and the OSs that run them). A client/server architecture, for example, demands more at both ends of the wire: both the server and the client must be smarter and more capable.

Viewed another way, the pendulum of user focus is swinging back, and the focal point of user interest has shifted from the extremes of the server-centric mainframe era and the desktop-focused PC epoch to a point somewhere in between. The emergence of workgroup applications (like Lotus Notes) and network-capable desktop OSs (like Windows 95) exemplify this trend. Such tools blur the distinction between "desktop" software like applications and desktop OSs and "network" software, to the extent that users may question what general IS infrastructure, not to mention LAN OS, their information needs require.

Microsoft is aware that network and desktop software are in this sense converging. In an effort to capitalize on this trend and sell more Windows NT Advanced Servers, it is leveraging its Windows (both 3.x and 95) desktop operating systems, its Office applications suite, and its software development tools (like Visual Basic) to the hilt. For example, in order for software to be eligible for the Windows 95 logo, it must be written to a specification that ensures it also runs under Windows NT — thus ensuring a wealth of NT applications and developer support.

It should come as no surprise that Microsoft is employing a particularly aggressive strategy to push Windows NTAS. Despite a presence in the LAN OS market for many years through LAN Manager and now Windows NT, Microsoft has failed to achieve real success. Since the LAN OS market represents the key to the enterprise for Microsoft, this shortcoming is particularly nagging. In order for Microsoft to go to the next level — to move beyond the desktop and into the enterprise — it must steal share from Novell, the LAN OS market leader.

Novell is leveraging the directory services functions in NetWare 4.1, highlighting the ability to develop and manage complex distributed network applications. Novell's extensive installed base, combined with the mission-critical nature of networks, will make them extremely difficult to overcome. In order for Novell to leverage its distributed network strategy, it must do a better job getting users to upgrade to Netware 4.x, something the vendor has been struggling with for years.

Overall, the LAN OS market grew 19% in terms of licenses, but decreased 4% in end-user sales value due to strong pricing pressure and a general transition to lower-priced products. During 1994, 1.0 million PC LAN OS licenses, representing 19.5 million PC nodes, were shipped worldwide. The dollar value of the licenses shipped in 1994 was $2.4 billion, down from $2.5 billion in 1993. Growth is expected to slow in the United States after 1997 with new license sales flat during 1998 and 1999. By 1999, IDC forecasts that 180 million PCs (installed) will be running a network operating system and that the dollar value of PC network operating system shipments will exceed $3.8 billion (see Table 10).

**Table 10**

**U.S. LAN Operating System Market Revenue, 1993–1998 ($M)**

| | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | CAGR (%) 1993–98 | CAGR (%) 1995–98 |
|---|---|---|---|---|---|---|---|---|
| LAN OS | 1,194 | 1,206 | 1,200 | 1,269 | 1,255 | 1,238 | 1 | 1 |
| Growth (%) | 14 | 1 | -1 | 6 | -1 | -1 | | |

Source: International Data Corporation, 1995

### *Market Shares: No Major Shifts*

There were no significant shifts in market share in the PC LAN OS segment in 1994. Novell's NetWare continued to account for approximately two-thirds (65.6%) of nodes shipped worldwide. Although NetWare 4.x shipments increased, sales were somewhat disappointing. NetWare 3.x remained Novell's dominant product, while 2.x shipments were minimal.

Microsoft increased its total market share to 9.4% of worldwide 1994 nodes on the basis of increased use of Windows for Workgroups as a peer-to-peer network operating system and sales of Windows NT Advanced Server (NTAS). Windows NTAS, utilized as a file and print server, totaled 52,000 licenses (5.5% market share).

In 1994, IBM OS/2 LAN Server increased its sales to 92,500 licenses and 1.6 million nodes worldwide (9.1% share). Meanwhile, Artisoft's LANtastic garnered sales of 683,000 nodes worldwide in 1994, earning a 3.5% market share, and Banyan's Vines accounted for 1.9 million nodes, or 6.1% share.

### *Definitions*

IDC defines a PC LAN operating system (OS) as software that enables PCs attached to local area networks to communicate with the network server (whether dedicated or nondedicated) and with other PCs on the network. PC LAN OSs must have the following functionality:

- File sharing among the PCs on the network
- File storage and retrieval to and from the file server
- Shared print services on the network

Additional features generally considered by IDC to be part of a PC LAN operating system include:

- Ability to run and customize multiuser (network) applications between multiple PCs or between PCs and the server. LAN electronic mail and database management systems are the prime examples of these applications.
- Network administration, directory, management, and security functions.
- Provision for LAN-to-LAN communications and gateways from the PC LAN to other systems (IBM mainframe gateways and remote dial-in).

IDC considers the following products to be PC LAN operating systems: Novell NetWare family (Personal NetWare, NetWare 2.x, 3.x, and 4.x); 3Com 3+ and 3+ Open; IBM PC Network Program, IBM OS/2 LAN Server; Microsoft LAN Manager (OS/2 or Unix), Microsoft Windows NT Advanced Server (NTAS), Microsoft's Windows for Workgroups (if used for peer-to-peer networking); AppleShare, Banyan Vines, Digital's Pathworks, and Artisoft LANtastic. In addition, any LAN OS designed around Novell's Portable NetWare, Microsoft's OS/2 LAN Manager, or LAN Manager/Unix are considered PC LAN OSs.

Both 1993 and 1994 figures are actual. Forecasted revenue figures are based on the average sales value of LAN OS products, where the average sales value is the average price the customer pays.

## TCP/IP

Twenty years after its invention, TCP/IP is emerging as the foundation for next-generation networking. Perhaps the most general force driving TCP/IP adoption is the desire of organizations to build tighter links between users and applications through client/server computing. Other related trends that account for the tremendous growth in TCP/IP use include the following:

- Growth in the use of Unix systems in commercial environments
- Increased role of TCP/IP in application development
- Embedding of TCP/IP within leading desktop and server operating systems
- Migration of enterprise networks to TCP/IP
- Expanded use of TCP/IP networks for remote access
- Broader Internet use in organizations

### *PCs Driving Growth*

The largest and most competitive market for TCP/IP products is the PC segment. From revenues of $287.9 million in 1994, the U.S. market for PC-based TCP/IP products will grow to $772.8 million in 1999 (see Table 11). Meanwhile, the worldwide percentage of PCs with TCP/IP will grow from 5.5% in 1994 to 66.1% by 1999 as TCP/IP is embedded in major desktop operating systems (like Windows 95) and firms continue their migration to network-centric computing.

**Table 11**

**U.S. PC TCP/IP Market Shipments, Installed Base, and Revenue, 1993–1999**

| | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | CAGR (%) 1993–1999 |
|---|---|---|---|---|---|---|---|---|
| Shipments (000) | 97 | 175 | 9,564 | 18,903 | 21,175 | 22,787 | 25,846 | 171.5 |
| Growth (%) | | 80.5 | 5,362.3 | 97.6 | 12.0 | 7.6 | 13.4 | |
| Installed base (M) | 3,380 | 6,562 | 12,205 | 27,131 | 46,816 | 62,936 | 76,234 | 63.3 |
| Growth (%) | | 94.1 | 86.0 | 122.3 | 72.6 | 34.4 | 21.1 | |
| Revenues ($M) | 144.1 | 287.9 | 528.5 | 725.9 | 808.0 | 810.0 | 772.8 | 21.8 |
| Growth (%) | | 99.8 | 83.6 | 37.4 | 11.3 | 0.2 | -4.6 | |

Source: International Data Corporation, 1995

The PC-server platform will emerge as the platform best suited to meet PC clients' demand for enhanced network services. As a result, the worldwide percentage of PC servers with TCP/IP will increase from 18.2% in 1994 to 66.1% in 1999. In their efforts to meet this demand, customers will leverage their desktop operating system expertise by using the related PC server operating system (such as

OS/2, or Windows NT Advanced Server) and by shopping through the same distribution channels.

### *Recommendations*

As TCP/IP becomes the base network standard, vendors will need to provide a full range of product services (stacks, applications, management tools, security) combined with a strong service and support organization. These services, which were traditionally built into the operating environment, are just emerging in distributed TCP/IP networks.

To capitalize on the growing migration to TCP/IP, vendors must articulate a clear strategy to customers and leverage TCP/IP's broad appeal in corporations. In addition, vendors must provide comprehensive solutions that integrate diverse systems in the enterprise. Customers will base their mission-critical network on TCP/IP and thus will select vendors that are experienced and committed to providing high-level network management, administration, and configuration tools.

### *Definitions*

The Transmission Control Protocol/Internet Protocol (TCP/IP) is actually a set of protocols developed in the early 1970s according to Department of Defense specifications for the communication of systems from multiple vendors. TCP/IP is the standard network protocol for Unix, and a family of applications has evolved on top of it. These include Telnet (terminal access), FTP (file transfer), SMTP (mail), and SNMP (management).

(Note: Data in the "Networking" section, except for the TCP/IP data, includes actual 1993 data, but 1994-and-beyond data is forecasted. Actual data for 1994 was not available in time for publication.)

# Services

The U.S. market for IT services (ranging from IT strategy consulting to farming out IT operations) is, by any measure, a huge beast. Billion-dollar, multiyear, multidimensional contracts — difficult to thoroughly analyze and nearly larger than life — are the norm.

Though exceptionally large, the services market is hardly ponderous. Over the past 12 months the nature of the supplier-buyer relationship has undergone a fundamental shift. Suppliers are not just suppliers any longer; they act as partners and collaborators. "Close" is the word in the services business. Customers demand that services suppliers understand not only their market, but the idiosyncrasies of their particular business. Gone are the days when blue-suited drones can take control of an IT shop and achieve any real, significant cost cutting by applying the same cookie-cutter solutions they developed down the street.

As a result, any company seeking to address the rapidly growing (forecasted to be 17.0% in the United States through 1998) market for IT services must be nimble. Interestingly, AT&T has recently formed an entire new business called AT&T Solutions to address this opportunity. Other types of IT suppliers — from hardware companies to channel partners and services providers — are under similar pressure to adapt.

From 1993 to 1994, global spending for outside services grew 9.4%, reaching nearly $63.0 billion. The U.S. services market will grow to a whopping $102.0 billion in 1998.

Within that bulk are dozens of smaller and well-defined niche markets. IDC carves the IT services pie into five broad parts: operational services, maintenance and support, implementation services, planning services, and training and education.

The maintenance and support category has always been the largest. In fact, this meat-and-potatoes category remains the biggest through 1998, growing from U.S. revenues of $26.6 billion in 1994 to $31.9 billion in 1998. Maintenance and support has also had flat growth for some time, though, and is actually the slowest growing of the service activities. High-growth IT services categories include operational services and planning services. (see Table 12).

Because demand is so strong, the outlook for providers of the entire spectrum of IT services is bright. To capitalize on this demand, however, IT services vendors must partner with their customers. Such partnerships not only require that vendors be fleet of foot, they must also know more. A firm grasp of IT and a track record of applying it is no longer enough. To be successful, IT service providers must demonstrate knowledge of the client's particular business and the capacity to combine that wisdom with IT prowess to produce a tailored solution.

*(Note: Data in the "Services" section includes actual 1993 data, but 1994-and-beyond data is forecasted. Actual data for 1994 was not available in time for publication.)*

**Table 12**

**U.S. Services Market Revenue, by Major Activities, 1993–1998 ($M)**

| | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | CAGR (%) 1993–1998 |
|---|---|---|---|---|---|---|---|
| Maintenance and support | 25,537 | 26,622 | 28,155 | 29,515 | 30,772 | 31,854 | 4.5 |
| Implementation services | 15,788 | 17,694 | 19,819 | 22,174 | 24,747 | 27,293 | 11.6 |
| Operational services | 8,812 | 10,056 | 11,970 | 13,983 | 16,337 | 18,884 | 16.5 |
| Planning services | 6,910 | 7,939 | 9,098 | 10,390 | 11,855 | 13,282 | 14.0 |
| Training and education | 5,863 | 6,525 | 7,310 | 8,307 | 9,268 | 10,189 | 11.7 |
| Total | 62,910 | 68,836 | 76,353 | 84,369 | 92,979 | 101,502 | 10.0 |

Source: International Data Corporation, 1995

## IT Training and Education Services

The fundamental challenge vendors face in the IT training and education service market is convincing potential customers that their employees need training and that it should be done externally. Three key strategies can help IT training and education firms face this challenge while also providing competitive differentiation: being a performance integrator, managing time-to-market effectively, and balancing global training initiatives to meet local needs.

### *Being a Performance Integrator*

Ideally, a successful external training organization offers seamless training solutions that help companies transition their employees from where they are to where they need to be. A salient analogy would be that of a movie production company, which operates by bringing together the best and brightest experts in various fields to create a complete team that can evolve as the need arises. The key to operating this type of service scenario is to position the organization as a performance integrator.

A performance integrator works as a partner with clients to develop and implement solutions that enable clients' employees to become not only highly skilled, technically savvy workers, but also workers who can do their jobs better. An integrator understands its client's problems, examines the idiosyncrasies of the client's particular business infrastructure, and helps manage change that will help increase worker productivity. Above all, a performance integrator goes beyond simply offering technical training to offer a variety of services that help clients change the way they work.

Examples of specific services that performance integrators provide are as follows:

- Training needs assessment
- Skills assessment
- Performance and job analysis
- Custom curriculum design and development
- Transition planning
- Project management
- Course instruction
- Mentoring
- Posttraining effectiveness evaluation

### *Managing Time-to-Market Effectively*

The importance of having training and education ready when the product ships cannot be discounted. Channels of distribution must have product because clients demand it, and end users are beginning to want it like never before. New product rollouts are being announced constantly, and training organizations must become experts at managing customer expectations.

It is a leading-edge training and education organization that can alleviate the anxieties or misconceptions of clients on prerelease products by developing beta courseware. Prior to the massive rollout of Windows 95, Microsoft organized a tremendously effective effort to get the market ready.

### *Balancing Global Training Initiatives to Meet Local Needs*

Few organizations offer truly global training. In international companies, country education managers tend to select their own course development and delivery strategies. They might communicate sporadically with country managers in other regions, but they do not regularly exchange information. This scenario is changing dramatically, however, because many CEOs place heightened emphasis on developing global operations.

Nearly 75% of attendants at a recent meeting of the Computer and Education Management Association (a professional association made up of individuals who manage training organizations in companies that manufacture hardware and software products) said their organizations are going global or are already operating globally. This is good news. We believe training and education organizations that centralize their operations will reap the benefits of integrating functions such as sales and marketing as well as course development and delivery. Clearly, a global organization will have greater capability to manage large-scale global contracts, but it will have to change its approach to selling.

The stakes for executing these strategies are growing fairly rapidly. Although relatively small, the U.S. IT training and education services market will grow steadily from $6.5 billion in 1994 to $10.2 billion in 1998. Carving out a niche in the rapidly evolving training and education market has never been easy and is only getting harder as the industry moves faster. However, firms that highlight key strategies in performance integration, time-to-market, and global initiatives will set themselves apart from the pack.

## Consulting

Consulting revenue in the United States is expected to nearly double from roughly $8 billion in 1994 to more than $15 billion in 1999. Like the outsourcing services market, the IT consulting services segment is relatively young and fast growing, with a 1994–99 CAGR of 14.0%. In contrast, the massive maintenance and support portion has a 1993–98 CAGR of just 4.5%.

The IT consulting market consists of 11 service segments. Design, IT strategy, process improvement, and operations assessment are the largest. However, business process reengineering, change management, process improvement, and IT strategy are growing more quickly. In short, customers' needs are maturing. As much as clients truly value IT design and strategy services, they are increasingly interested in offerings more directly related to their business.

Perhaps the most important force driving increased spending on IT consulting is the increasingly intimate tie between information technology and an organization's long-term success. Few organizations possess expertise in designing systems with multiple technologies. Even fewer understand how technologies can be implemented in a fashion that will maximize either competitiveness or investment return. Consequently, demand is high for consultants with a combination of business and technology expertise to provide advice on IT strategy, benchmarking, and how technology can improve business performance. As a result, in addition to IT expertise, IT consultants are now expected to provide services similar to those of general business consultants.

The importance of information technology to organizations suggests that IT consultants will need to partner even more closely with clients in the future. Consider the following IT consulting market trends:

- IT planning and design services remain the most important IT service to large and small IT buyers in almost every vertical market around the globe according to IDC's *1994 Global IT Survey*.
- Service providers expect IT consulting to account for a growing portion of their overall professional services activity and revenue. Except for consultants and outsourcers, all providers expect to do more consulting in the future. The most dramatic change is expected in the vendor/OEM category.

- IT suppliers continue to provide more process expertise, such as process improvement and reengineering services. For many vendors, these are new areas of expertise.
- The largest service companies believe they need to develop vertical market expertise. Size alone will no longer ensure success in consulting. Specific industry expertise allows larger suppliers to combine consulting recommendations with integrated solutions.

### Systems Integration

U.S. systems integration services revenue will jump from $16 billion in 1994 to $28 billion in 1999. Compared to consulting and outsourcing, the integration services market is the most mature. Nonetheless, relative to the broader IT services market (which has a CAGR of 10.0% in the United States from 1993–98) integration is growing with the pack given its CAGR of 11.8% from 1994–99 in the United States.

Traditional forces, like downsizing and the increasing complexity of heterogeneous computing environments, continue to drive SI growth. However, the increasingly strategic nature of IS departments, expansion of the customer base beyond MIS, and additional business generated by strong consulting demand are also shaping the market:

- As firms continue to invest in IT, their expectations rise. As a result, IS departments need to move beyond basic operations. Managers of IS departments must make decisions that define and affect the organization's core strategy. Increasingly, IS shops are leveraging external expertise and offloading tasks like integration work so that they can stay strategically focused.
- The past year has also shown that SI buying is expanding outside MIS and throughout many layers of user organizations. As a result, and in addition, integration projects become even more complex, and sales cycles are lengthened.
- Strong demand for IT consulting is also generating additional need for system integration services. Since most IT consulting projects contain integration, as IT consulting demand grows, so does integration. Some of the integration business may be captured by the firm that provided the consulting, in the case of a broad-based provider like CSC, but in other cases another firm (or host of firms) may gain the work. Service providers indicate that growth in consulting is generating quite a bit of integration business. However, because of the varied linkages between consulting projects and the resulting integration, IDC so far is unsure how much is hype and how much is real new business.

In fact, the systems integration market, like the broader IT services business, is polarizing to general service providers on the one hand and specialized, more vertical players on the other. At the same time, customers are also demanding greater flexibility across this spectrum. Thus, although the integration market is growing as a whole, the

requirements of doing business are changing. Here are some key systems integration market trends:

- Companies that have the most aggressive plans for IT spending are investing in external systems integration services. As businesses mature in their use of IT, off-loading integration becomes more attractive.
- Use of external systems integration services varies considerably by industry. Firms in the wholesale/retail and banking industries are frequent users; companies in the insurance and transportation fields tend to look internally for support.
- Fixed-price and fee-for-service (time-and-material) contracts continue to dominate as pricing strategies. Contracts vary significantly by provider segment as a percentage of overall contracts. For example, consultants, outsourcers, and systems integrators have the lowest percentage of fixed-price contracts; VARs, software vendors, and independents have the highest.
- Positioning as a general versus a specialized service provider continues to vary by provider size. As expected, large providers position themselves as having the broadest service capability and small players have the narrowest range of services to offer.
- Independent service providers and consultants provide the most customized service solutions, and VARs provide the most packaged solutions. As the services market matures, vendors are positioning themselves to provide a specific type of service.
- Gross margins for systems integration currently range between 25% and 50%. IDC will be investigating this point more thoroughly in the future, but preliminary results show that the range of gross margins varies about 15% across provider types.

## Outsourcing

Outsourcing remains among the fastest-growing component of the worldwide services industry. The outsourcing services market is the hottest of the hot, with a CAGR in the United States of 16.0% for 1994–99.

How realistic is this kind of growth? Three factors may limit outsourcing's expansion:

- Customers are increasingly concerned with the value of outsourcing as opposed to simply cost: to what degree does outsourcing really allow them to focus on their core businesses and competencies?
- Many organizations are concerned about losing flexibility in technology decisions.
- Long-term pricing agreements have locked vendors and customers into prices that have become inappropriate.

Despite these potentially limiting factors, the outlook is strong because outsourcing makes good business sense. Activities like network services, help desk operations, and disaster recovery plans remain a function of economies of scale. For this reason outsourcers can offer user organizations great cost savings.

But there's more. Over the past year, relations between buyers and sellers have matured. Vendors and clients are moving toward a partnership approach, fueled by common incentives and on the foundation of a joint vision and mutual values. They have built practices that encourage flexibility and trust — requirements for today's dynamic outsourcing arrangements. Outsourcing suppliers can introduce their clients to additional savings.

Finally, information technology is of growing importance to businesses. The importance of IT is becoming clearer to senior management, and the accelerated turnover of IT and the premium placed on outsourcing talent are making it difficult for IS organizations to retain best-of-breed organizations and architectures. Instead, customers want to focus on, and invest in, their core competencies and leave information planning and delivery to others.

The net result is indeed a very strong outlook for the outsourcing market. Worldwide outsourcing services revenue will grow from $18 billion in 1994 to nearly $33 billion in 1999. The U.S. portion is expected to double from roughly $8 billion in 1994 to almost $16 billion in 1999.

To succeed in the complex but lucrative outsourcing market, suppliers need to recognize the following:

- Rapidly changing requirements and cost structures for information technology are forcing a change in the relationship between the outsourcer and the customer. Dynamic partnerships are required.
- The banking and communication industries have the highest percentage of moderate-to-heavy usage of external data center outsourcing services. While other growth areas are likely to appear, these are the current cash-cow markets.
- Companies' needs for information and solutions are increasing, including the desire for access to top-notch technology. As a result, outsourcing contracts have evolved away from mere low-cost service and toward solutions to real business problems. Cost is still important, but results make for lifelong customers.
- Customers are expecting more from their outsourcers. For example, the percentage of outsourcing contracts containing network management, application design and maintenance, and distributed systems management services is increasing. Application services has not always been considered an outsourcing activity. Two factors explain the current interest. Customers are looking to outsource existing applications as they migrate to new applications and architectures. And, it is increasingly difficult to attract outside talent for systems development.

## System Support Services

The system support services market is the largest and most mature segment of the IT services industry. From 1994 revenues of $14.1 billion, the U.S. system support services market will grow to $15.0 billion by 1999, yielding a 1994–99 CAGR of just 1.3%. Growth for the overall category is fairly anemic, the result of slow-to-negative growth in the segment's largest sectors. Smaller, non-break/fix-oriented service categories hold promise.

Slow growth for the overall system support services category is largely the result of a decline in the on-site hardware troubleshooting segment, which, in 1993, accounted for 37% of U.S. system support service revenues. From 1993–1998 this segment will continue its ongoing and steady decline from $5.1 billion in 1993 to $3.3 billion in 1998 (the end of the latest forecast period), a -8.5% CAGR. The second-largest segment, parts support, is growing, but only very slowly given a 1.5% 1993–1998 CAGR.

Some smaller system support services segments are growing rapidly. For example, from a base of $213.0 million in 1993, U.S. revenues in the systems management category will nearly double by 1998 to $410.0 million. Other smaller categories, like online knowledge bases and asset management services, are newly emerging markets that represent high-growth market opportunities. The online knowledge base market will grow from U.S. revenues of just over $15.0 million in 1993 to $207.0 million in 1998, whereas asset management services will expand from $16.1 million in 1993 to $139.1 million in 1998.

As these revenue trends indicate, the system-support service requirements of customers are changing. In general terms, growth opportunities lie more in software-based or related areas than in traditional break/fix services. This shift is the result of customer migration to more distributed computing architectures like client/server, as well as increased use of complex, PC-based networks. In today's distributed environments, customers demand multivendor expertise in addition to systems management and operational services. To fill these needs, vendors must have a more holistic view of customers' environments, and they must be in touch with each customer's specific service needs.

# Appendix A:
# IDC's Software Taxonomy and LAN Market Overview

## Table A1

## IDC's Packaged Software Functional Taxonomy

| Primary Markets | Application Solutions | | | Application Development Tools | | System-Level Software | | |
|---|---|---|---|---|---|---|---|---|
| Secondary Markets | Consumer Applications | Cross-Industry Applications | Vertical-Industry Applications | Information Access Tools | Programmer Development Tools | Systems Management Software | Operating Systems | Utilities/Middleware |
| Markets | Home education/ edutainment<br>Games and entertainment<br>Home productivity | Accounting<br>Human resources<br>Distribution<br>Project management<br>(Office applications)<br>Word processing<br>Other office apps.<br>Other cross-industry applications | Banking/finance<br>Insurance<br>Health care<br>(Manufacturing)<br>Process manufacturing<br>Discrete manufacturing<br>Mechanical CAD<br>EDA<br>Other vertical applications | Spreadsheets<br>Multidimensional analysis tools<br>Executive information systems<br>End-user query and reporting<br>Statistics and tech. data analysis<br>Spatial data management<br>End-user DBMS<br>Other information access tools | DBMS engines<br>Object DBMS<br>CASE<br>Object CASE<br>3GLs and development environments<br>Testing tools<br>GUI builders and frontware<br>Object-oriented programming<br>4GL and report writers<br>AI and expert systems builders<br>Other programmer development tools and utilities | Management platforms<br>Automated operations<br>Storage management<br>Performance management<br>Change and configuration management<br>Security management<br>Resource accounting<br>Problem management | Operating systems | Distributed object management<br>Middleware<br>System utilities |

Note: Parentheses indicate an aggregation of the indented markets that follow.
Source: International Data Corporation, 1995

## Table A2

## U.S. LAN Market Revenue, 1993–1998

| | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | CAGR (%) 1993–98 | CAGR (%) 1995–98 |
|---|---|---|---|---|---|---|---|---|
| PC NICs | 1,905 | 1,800 | 1,824 | 1,922 | 1,803 | 1,660 | 2.7 | -3.1 |
| Growth (%) | 19 | -6 | 1 | 5 | -6 | -8 | | |
| % of WW | 57 | 53 | 50 | 47 | 43 | 41 | | |
| LAN OS | 1,194 | 1,206 | 1,200 | 1,269 | 1,255 | 1,238 | 1 | 1 |
| Growth (%) | 14 | 1 | -1 | 6 | -1 | -1 | | |
| % of WW | 49 | 51 | 45 | 43 | 40 | 38 | | |
| Routers | 944 | 1,305 | 1,546 | 1,743 | 1,830 | 1,814 | 14 | 5 |
| Growth (%) | 53 | 38 | 18 | 13 | 5 | -1 | | |
| % of WW | 53 | 51 | 50 | 49 | 48 | 46 | | |
| Hubs | 1,550 | 1,813 | 2,135 | 2,239 | 2,064 | 1,897 | 4 | -4 |
| Growth (%) | 54 | 17 | 18 | 5 | -8 | -8 | | |
| % of WW | 59 | 58 | 54 | 50 | 44 | 41 | | |
| Backbone switches | 49 | 172 | 278 | 445 | 592 | 654 | 68 | 33 |
| Growth (%) | 168 | 252 | 61 | 60 | 33 | 10 | | |
| % of WW | 59 | 58 | 54 | 50 | 44 | 41 | | |
| Remote-access servers (non-PC) | 140 | 248 | 438 | 572 | 635 | 669 | 37 | 15 |
| Growth (%) | 71 | 77 | 77 | 31 | 11 | 5 | | |
| % of WW | 70 | 72 | 73 | 71 | 69 | 66 | | |
| Total | 5,782 | 6,545 | 7,421 | 8,190 | 8,179 | 7,931 | 7 | 2 |
| Growth (%) | 32.3 | 13.2 | 13.4 | 10.4 | -0.1 | -3.0 | | |
| % of WW | 55.1 | 54.3 | 51.1 | 48.6 | 45.4 | 42.7 | | |

Source: International Data Corporation, 1995

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